



STANDARDIZATION AS A SUPPORT TO INNOVATION AND SUSTAINABLE DEVELOPMENT IN THE TEXTILE INDUSTRY

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ABSTRACT: The textile industry faces increasing demands related to product quality, production efficiency, and the sustainability of textile products. In this context, standardization provides a structured framework for defining technical requirements, ensuring product comparability, and supporting the application of modern technologies in the manufacturing and testing of textile products. In Serbia, the Institute for Standardization of Serbia (ISS) is responsible for the adoption of Serbian standards and related documents, including the adoption of international and European standards at the national level. Through this process, national standards in the field of textiles become available for application in industry, contributing to the alignment of production, testing, and product evaluation with internationally recognized requirements. Textile standards define essential product characteristics, including fibre composition, mechanical properties, durability, colour fastness, maintenance, and labelling. Their application enables consistent quality control, facilitates the introduction of new materials and technologies, and supports the optimization of production processes. At the same time, they contribute to extending product lifetime and improving resource efficiency, which are key aspects of sustainable development and the transition to a circular economy.

Recent developments in the textile sector, including circular economy models, smart textiles, and digital solutions such as the Digital Product Passport, further emphasize the importance of reliable and standardized product data. Such data provide a necessary foundation for improving product performance, supporting sustainable practices, and enabling the effective application of emerging concepts in the textile industry.

Keywords: standardization, textiles, innovation, sustainability, circular economy, Digital Product Passport.

STANDARDIZACIJA KAO PODRŠKA INOVACIJAMA I ODRŽIVOM RAZVOJU U TEKSTILNOJ INDUSTRIJI

APSTRAKT: Tekstilna industrija suočava se sa sve većim zahtevima koji se odnose na kvalitet proizvoda, efikasnost proizvodnje i održivost tekstilnih proizvoda. U tom kontekstu,



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standardizacija obezbeđuje uređen okvir za definisanje tehničkih zahteva, uporedivost proizvoda i podršku primeni savremenih tehnologija u proizvodnji i ispitivanju tekstilnih proizvoda. U Srbiji je Institut za standardizaciju Srbije nacionalno telo za standardizaciju nadležno za donošenje srpskih standarda i srodnih dokumenata, uključujući preuzimanje međunarodnih i evropskih standarda na nacionalnom nivou. Na taj način srpski standardi iz oblasti tekstila postaju dostupni za primenu u industriji i doprinose usklađivanju proizvodnje, ispitivanja i ocenjivanja proizvoda sa međunarodno priznatim zahtevima. Standardi u oblasti tekstila definišu važne karakteristike proizvoda, uključujući sastav vlakana, mehanička svojstva, trajnost, postojanost obojenja, održavanje i označavanje. Njihova primena omogućava doslednu kontrolu kvaliteta, olakšava uvođenje novih materijala i tehnologija i podržava optimizaciju proizvodnih procesa. Istovremeno, standardi doprinose produžavanju veka trajanja proizvoda i efikasnijem korišćenju resursa, što predstavlja značajan aspekt održivog razvoja i prelaska na cirkularnu ekonomiju. Savremeni pravci razvoja u tekstilnom sektoru, uključujući modele cirkularne ekonomije, pametni tekstil i digitalna rešenja kao što je digitalni pasoš proizvoda, dodatno ističu značaj pouzdanih i standardizovanih podataka o proizvodu. Takvi podaci predstavljaju neophodnu osnovu za unapređenje performansi proizvoda, podršku održivim praksama i efikasnu primenu novih koncepata u tekstilnoj industriji.

Ključne reči: standardizacija, tekstil, inovacije, održivost, cirkularna ekonomija, digitalni pasoš proizvoda

1. INTRODUCTION

The textile and apparel sector is undergoing a significant transformation driven by market expectations, technological development, environmental requirements and the need for transparent product information. Quality, durability, safety, resource efficiency and reliable labelling are no longer separate issues, but parts of a broader framework in which manufacturers, testing laboratories, public authorities and consumers require comparable and verifiable information.

The textile industry is also directly affected by changes related to sustainability, circular economy, digitalization and new means of product communication. In this context, standards provide a common technical language and enable the measurement, comparison and verification of product characteristics. They are important not only for traditional quality control, but also for the development of new materials, new production processes, environmental claims and digital product data.

The aim of this paper is to present standardization as a practical support mechanism for innovation and sustainable development in the textile industry, with a focus on the Serbian national standardization system. The paper outlines the role of the Institute for Standardization of Serbia, the functioning of technical committees, the fields covered by KS F038 and KS F072, and selected SRPS standards relevant to product quality, the circular economy, digitalization and the Digital Product Passport.



2. STANDARDIZATION AS A SUPPORT TO INNOVATION AND SUSTAINABILITY IN TEXTILES

2.1. Standardization framework in Serbia

The Institute for Standardization of Serbia is the national standardization body responsible for activities related to the development, adoption, publication, maintenance, review and withdrawal of Serbian standards and related documents. Through the adoption of international and European standards as Serbian standards, the Institute connects national economic and regulatory needs with international and European standardization processes. The strategic priorities of the Institute include the adoption of Serbian standards, greater availability of standards in Serbian, cooperation with interested parties, digitalization of processes and participation in international and European standardization organizations. The development, publication, maintenance, review and withdrawal of Serbian standards and related documents are regulated by the Internal Rules of Standardization. The establishment and work of technical committees are regulated by a separate part of these rules. These documents are harmonized with the Law on Standardization, the founding acts of the Institute and the rules of international and European standardization organizations [5], [6].

Technical committees are the expert bodies through which the professional work of the Institute is carried out in specific fields. Their work is based on the voluntary participation of interested parties, including industry, public authorities, universities, laboratories, consumers and other organizations. In the textile sector, this is particularly important because practical needs from production, testing, import, inspection and market communication can be transferred into the national standardization process.

Standardization is not limited to the formal adoption of documents. It also represents a mechanism for connecting experts, institutions and industry with European and international technical requirements. In this way, standards become an important tool for improving product quality, increasing market transparency and supporting sustainable industrial development.

2.2. Technical committees in the textile field: KS F038 and KS F072

The work of technical committees is especially important in areas where production, testing, safety and market communication are closely connected. In the textile field, two committees are particularly relevant: KS F038, Textiles, and KS F072, Textile machinery and accessories.

The scope of KS F038, Textiles, covers standards in the field of fibres, yarns, threads, cords, ropes, apparel and other manufactured textile materials. It also includes testing methods, terminology and definitions, raw materials, auxiliary materials and chemical products used for production and testing, as well as specifications for textile products. The committee also covers certain wall coverings. KS F038 follows the work of ISO/TC 38, CEN/TC 248 and CEN/TC 99 [7].

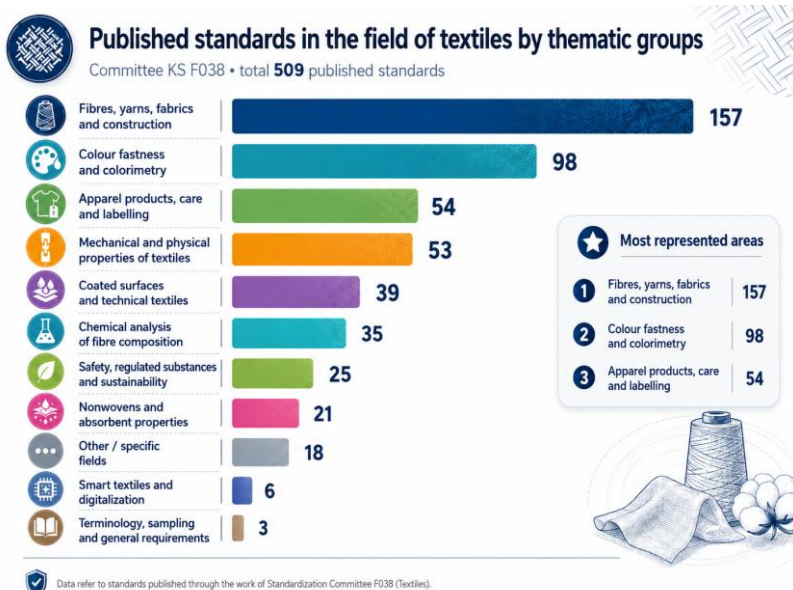


Figure 1: Published standards in the field of textiles by thematic groups, Committee KS F038. Source: Prepared by the authors on the basis of ISS records on published standards, 26 May 2026.

Based on an internal classification prepared for this paper from ISS records, KS F038 includes 509 published standards. The grouping is an analytical overview rather than an official committee classification. The largest groups relate to fibres, yarns, fabrics and construction; colour fastness and colorimetry; apparel products, care and labelling; and mechanical and physical properties of textiles. These areas confirm that the core of textile standardization is linked to product composition, durability, performance and user information, while newer groups such as sustainability, smart textiles and digitalization indicate future development directions.

KS F072, Textile machinery and accessories, prepares standards in the field of textile machinery and accessories, including machinery for dry-cleaning and industrial laundry. The committee follows the work of ISO/TC 72 and CEN/TC 214, as reflected in its business plan [8]. The thematic overview of 84 published standards shows that the most represented areas are weaving, knitting and fabric manufacturing equipment, safety requirements for textile machinery, and noise testing and noise reduction.

This structure reflects the practical needs of users and manufacturers of textile machinery: safe operation, reliability, compatibility of equipment and measurable noise-related performance. The role of these standards is therefore connected not only with safety, but also with modernization, process control and resource-efficient production.

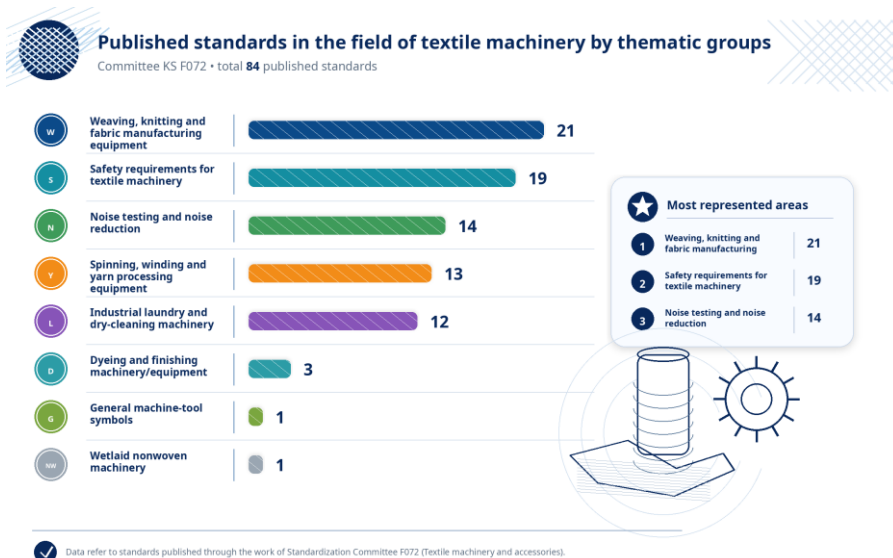


Figure 2: Published standards in the field of textile machinery by thematic groups, Committee KS F072. *Source: Prepared by the authors on the basis of ISS records on published standards, 26 May 2026.*

2.3. Selected SRPS standards supporting product quality and comparability

Innovation in textiles can be accepted by the market only when product characteristics are measurable, repeatable and comparable. Standards provide the technical basis for this process because they define terminology, testing conditions, test methods, classification systems and requirements for product information.

Within KS F038, this role is supported by standards such as SRPS EN ISO 139:2007, which defines standard atmospheres for conditioning and testing, the SRPS EN ISO 1833 series for quantitative chemical analysis of fibre mixtures and the SRPS EN ISO 105 series for colour fastness testing. These standards are important because they enable comparable test results and reduce uncertainty in communication between producers, laboratories, buyers and other interested parties.

Durability and use-phase performance are supported by standards such as SRPS EN ISO 105-C06:2016 for colour fastness to domestic and commercial laundering, SRPS EN ISO 5077:2010 for dimensional change in washing and drying, the SRPS EN ISO 12945 series for pilling, fuzzing and matting, and the SRPS EN ISO 12947 series for abrasion resistance by the Martindale method. These standards are directly connected with product lifetime, consumer satisfaction and the possibility of verifying product claims.

Product information is also an important part of textile quality. SRPS EN ISO 3758:2024, which relates to care labelling symbols, provides a basis for clear and standardized communication about maintenance. In practice, proper care information can contribute to longer product use, fewer consumer complaints and more responsible consumption.



In this way, classical textile standards remain relevant even in the context of new sustainability requirements. Reliable information on fibre composition, dimensional stability, colour fastness, abrasion resistance and care instructions is necessary both for traditional quality control and for future digital systems that will rely on verified product data.

2.4. Standards supporting sustainability, circular economy and digitalization

Sustainability requirements increasingly depend on reliable and verifiable information. In the textile industry, environmental communication must be based on clear terminology, recognized methods and transparent data. SRPS CEN/TS 16822:2016 is relevant because it deals with self-declared environmental claims and the use of terms in relation to textiles and textile products. This is important for reducing ambiguity in environmental communication and limiting the risk of misleading claims.

A specific environmental issue is the release of microplastics from textile sources. SRPS EN ISO 4484-1:2023 specifies a method for determining material loss from fabrics during washing, while SRPS EN ISO 4484-3:2023 deals with the measurement of collected material mass released from textile end products by the domestic washing method. At the time of drafting this paper, the national adoption project nkSRPS EN ISO 4484-4:2025 was also under development, indicating the further extension of the series towards quantitative thermal or gravimetric analysis of certain synthetic materials released from fabrics during washing.

The terminology basis is provided by SRPS EN ISO 5157:2023, Textiles — Environmental aspects — Vocabulary. Circularity-related standardization is also developing through projects such as dnaSRPS CEN/TS 18272-1:2025, intended to provide general principles and guidance for the circular economy of textile products, and prSRPS CEN/TS 18272-2:2026, which addresses design for circularity.

The Digital Product Passport should not be understood merely as an IT solution. Its value depends on the reliability of the data entered into the system. For textiles, information on fibre composition, care, durability, chemical content, repairability, recyclability, recycled content and microplastic release must be based on recognized terminology and test methods. Document CWA 18186:2025 gives guidance for setting up Digital Product Passports, while CWA 18291:2025 deals specifically with data collection, traceability and transparency in textile supply chains in the context of the Digital Product Passport.

Smart textiles are another emerging field. SRPS CEN ISO/TR 23383:2021 provides definitions, categorisation, applications and standardization needs for smart or intelligent textiles. More specific examples are SRPS EN ISO 24584:2022, which defines a test method for sheet resistance of conductive textiles using a non-contact method, and SRPS EN ISO 17971:2025, which defines a test method for determining screen-touch properties of fabrics.

Within the scope of KS F072, machinery standards also support sustainable production. The SRPS EN ISO 11111 series deals with safety requirements for textile machinery, the SRPS EN ISO 9902 series provides rules for testing noise emitted by textile machinery, SRPS EN ISO 23771:2016 gives guidance for designing textile machinery with reduced



noise emissions, and the SRPS EN ISO 8230 series covers safety requirements for dry-cleaning machines. These documents are relevant because sustainable production also depends on safe, efficient and well-controlled machinery.

Table 1: Examples of standards and standardization documents supporting innovation and sustainability in textiles

Area	Examples of standards/documents	Relevance
Product quality, durability and care	SRPS EN ISO 139:2007; SRPS EN ISO 105 and 1833 series; SRPS EN ISO 5077:2010; SRPS EN ISO 12945/12947 series; SRPS EN ISO 3758:2024	Comparable testing, reliable product information, quality control and longer product lifetime.
Environmental claims and circularity	SRPS CEN/TS 16822:2016; SRPS EN ISO 4484-1:2023 and SRPS EN ISO 4484-3:2023; nkSRPS EN ISO 4484-4:2025 (project); SRPS EN ISO 5157:2023; dnaSRPS CEN/TS 18272-1:2025 and prSRPS CEN/TS 18272-2:2026 (projects)	Verified claims, microplastic assessment, environmental terminology and circular design principles.
Digital data and smart textiles	CWA 18186:2025; CWA 18291:2025; SRPS CEN ISO/TR 23383:2021; SRPS EN ISO 24584:2022; SRPS EN ISO 17971:2025	Traceability, data credibility, interoperability and new functional properties.
Textile machinery	SRPS EN ISO 11111 series; SRPS EN ISO 9902 series; SRPS EN ISO 23771:2016; SRPS EN ISO 8230 series	Machinery safety, noise reduction, reliable operation and sustainable production.

Source: Authors' synthesis based on ISS records for KS F038 and KS F072. Selected projects are included where they indicate further development of circularity-related requirements.

2.5. Discussion of standardization priorities in the textile sector

The thematic overview of published standards shows that textile standardization in Serbia is strongly grounded in traditional areas of product quality, testing, care and labelling. This is an advantage because these areas provide the measurable foundation required both for conventional quality assurance and for new sustainability-related requirements. Standards on colour fastness, mechanical properties, fibre composition and care labelling are also relevant for digital product data because they provide evidence behind product claims.

At the same time, the smaller number of standards in areas such as smart textiles, digitalization and sustainability indicates the need for increased attention. For KS F038,



further work should combine established testing standards with more active monitoring of documents related to environmental claims, microplastics, circularity, traceability and digital product information. For KS F072, priorities remain machinery safety and noise reduction, with additional attention to machinery-related aspects of efficient and sustainable production.

In practical terms, standards support communication between industry, testing laboratories, public authorities and consumers. They are not only technical documents used in laboratories or production facilities, but also provide a framework for describing product characteristics, confirming quality, supporting environmental claims and preparing reliable data for future digital systems.

The importance of standards is expected to further increase with the development of circular economy models and the Digital Product Passport. These concepts require data that are not only available, but also comparable, structured and credible. The connection between textile standards, machinery standards, environmental requirements and digital data systems therefore represents one of the key future priorities for the textile sector.

3. CONCLUSION

Standardization in the textile industry is a practical tool that supports quality, safety, comparability, innovation and sustainable development. Through the work of the Institute for Standardization of Serbia and its technical committees, international and European standards are made available to interested parties in Serbia, while national experts are enabled to participate in European and international standardization processes.

The analysis of KS F038 and KS F072 shows that published standards cover both established and emerging areas. The selected Serbian standards and standardization documents discussed in this paper are relevant to fibre composition, colour fastness, care labelling, abrasion and pilling resistance, environmental claims, microplastics, the circular economy, smart textiles, machinery safety and noise reduction.

In the context of the circular economy and the Digital Product Passport, standards will become even more important because product data must be reliable, interoperable and accessible. Further development of standardization in the textile field should therefore continue to connect established testing and quality requirements with new topics such as circularity, traceability, digital product information and sustainability in textile production and use.

The role of standardization should be understood not only as a formal technical activity, but also as practical support for innovation, industrial development and responsible market communication. For the textile industry, this means that standards can contribute to better product quality, reduced environmental impact, more reliable environmental information, safer production processes and stronger alignment with European and international sustainability goals.



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