

# Standards in nano-technology and particle sizing

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# Who we are

- BSI is the business standards company that helps organizations **make excellence a habit**, so they can
  - Perform better
  - Reduce risk
  - Grow sustainably
- Over **65,000** clients in **150** countries worldwide, from globally recognised brands to small, local companies
- Founded in 1901, BSI were the **world's first National Standards Body**, a **founding member of ISO** and are responsible for shaping the majority of the world's most widely adopted standards, including ISO 9001, 14001 & 18001
- We're a Royal Charter company, so we reinvest our profits back into our business and are **customer focused**, not driven by short-term shareholder demands



BSI, a Royal Charter Company

# Our experience

For over 100 years BSI has shaped standards of excellence adopted by organizations world-wide

BSI began in **1901** with the 1<sup>st</sup> meeting of the engineering Standards Committee, convened by John Wolfe-Barry, designer of London's Tower Bridge.

In 1903 our **Kitemark** was registered and as such is one of the oldest Trustmarks still in use today.

BSI was the first **National Standards Body** and a founding member of the International Organization for Standardization (**ISO**).

During the last 100 years we've shaped many of the worlds most important standards to enhance organizational performance

ISO 9001 was based on BSI's BS 5750 and has become the **world's most adopted standard**. Furthermore, BSI shaped the original standards that led to:

- Information Security (ISO/IEC 27001)
- Environment Management (ISO 14001)
- Health & Safety (OHSAS 18000)
- Business Continuity (ISO 22301)

BSI not only shapes standards for **products** and **business processes**.

Our 3<sup>rd</sup> Generation of Standards are centred around **behaviour and values** to help organizations reach their full potential through their people.



Product Specifications

1900



Business Processes

1950



Business Potential

2000

# BSI helps organizations embed excellence and reap the benefits

We share our standards in the **format you need**, from paper to interactive digital content

Our assessors understand your business and give you **proven ways of measuring excellence**, so you can promote it confidently

Shape

Share

Embed

Assess

Support

Together with **independent experts** we shape the standards of excellence across products, processes and business potential

Our trainers **transfer the knowledge** your people need to embed our standards into your organization

We support you with the knowledge and tools you need to recognize excellence and **continually improve...**

# Shaping standards for the issues of today and tomorrow

BSI originated the majority of the most widely used and implemented international standards, including:

- Quality Management (ISO 9001)
- Information Security (ISO/IEC 27001)
- Health & Safety (OHSAS 18000)
- Environment Management (ISO 14001)
- Business Continuity (ISO 22301)

We offer an open transparent consensus process for standards making either at national and international level or at the less formal private and industry sponsored level

Over 30,000 current standards in portfolio and over 2,500 published each year



BSI has over 100 years experience in developing standards together with panels of experts from

- Business
- Government bodies
- Trade associations
- Consumer groups

Shape

Share

Embed

Assess

Support

# BSI pioneered the development of the worlds leading standards

For over a century BSI has worked with industry to build consensus and develop standards of excellence

Year	British Standard	ISO Standard
1987	BS 5750	ISO 9001 ( <b>Quality Management</b> )
1992	BS 7750	ISO 14001 ( <b>Environmental Management</b> )
1995	BS 7799	ISO/IEC 27001 ( <b>Information Security</b> )
1996	BS 8800	OHSAS 18001 / AS/NZS 4801 ( <b>Occupational Health &amp; Safety</b> )
2000	BS 8600	ISO 10002 ( <b>Customer Satisfaction</b> )
2002	BS 15000	ISO/IEC 20000 ( <b>IT Service Management</b> )
2002	TS 16949	ISO/TS 16949 ( <b>Automotive</b> )
2009	BS 16001	ISO 50001 ( <b>Energy Management</b> )
2009	BS 5750 (based)	AS 9100 ( <b>Aerospace</b> )
2012	BS 25999	ISO 22301 ( <b>Business Continuity</b> )
2012	BS 8901	ISO 20121 ( <b>Sustainable Events</b> )

# BSI services

Delivers tailored standards-based solutions to private clients, governments, trade associations and international institutions

- Standards development
- Knowledge Centre
  - Access to all major standards databases
  - Research
- Consulting
  - Standards portfolio mapping
  - Standards roadmap
  - Ad-hoc standards projects
- PAS standards – market driven
  - Fast sponsored route to a BSI endorsed standard
  - Seed document for BS and ISO
  - Co-branded with sponsor

# Why a standards is needed.

- Standards ensure that products and services are:
  - Provide source of knowledge
  - Creating market access
  - Levelling the playing field
  - Removes barriers to trade
  - Ensuring interoperability
  - Reducing time to market
  - Creating market acceptance
  - Enhancing quality and safety
  - Making test methods repeatable



# Why adopt a standard/s:

- **Required:**

- The standard may form part of a contract,
- The Standard may be part of obligation to CE or some other quality mark,
- The Standard may be referred to in legislation,
- The Standard may be required within the supply chain.

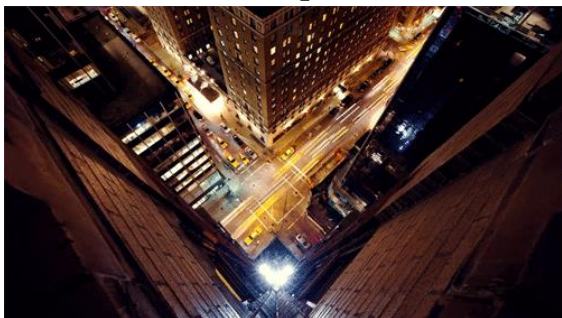
- **Recommended:**

- A good rationale would be presented, adoption of the standard may improve business performance,
- May improve business practice,
- A very large percentage of export is influenced by the European and international standards business,
- May form part training potentially for employees,
- Interoperability with other standardised products or components.

- **Information:**

- Elements from a standard could be taken into company best practise without full adoption,
- May form part training potentially for employees,
- Could form guidance to day to day business.

# So how many standards are there?



PAS 181:2014 - Smart city Framework. Guide to establishing strategies for smart cities and communities



BS 185-6:1970 - Glossary of aeronautical and astronautical terms. Ballistic and guided missiles



BS 8445:2012 - Bath and shower mats. Testing. Assessment of slip resistance properties safety signs



BS 8888:2011 - Technical product documentation and specification

# Standards development

- A Standard is developed by a panel of experts, within a **technical committee**. Once the need for a standard has been established, these experts meet to discuss and negotiate a draft standard.
- As soon as a draft has been developed it is shared with members who are asked to comment and vote on it.
- If a consensus is reached the draft becomes a standard, if not it goes back to the technical committee for further edits, or it is cancelled.
- Consensus driven standards, can take time to develop, can meet with objection from stakeholders.

# Who sets all these standards?

- Someone has an idea?



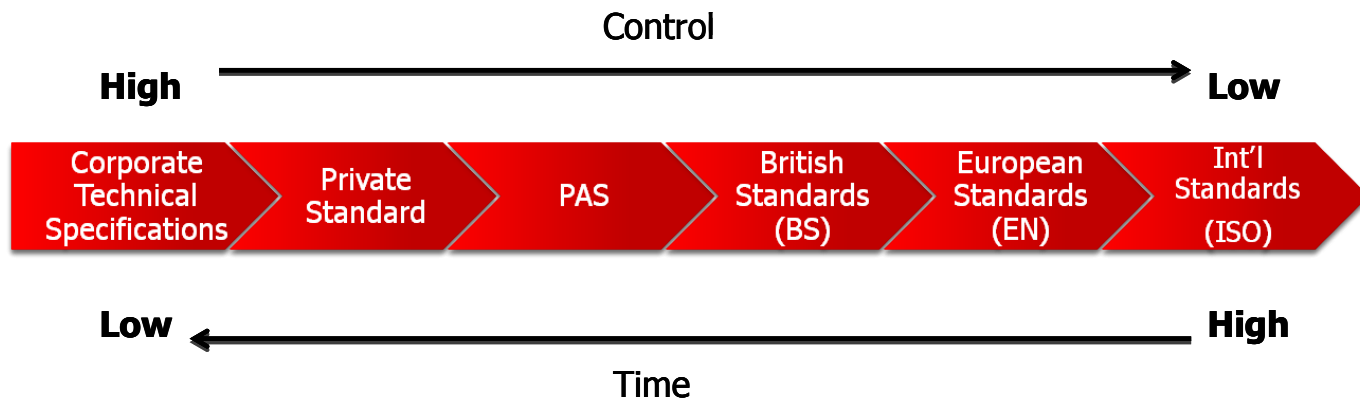
National Standards Body



# Types of standards

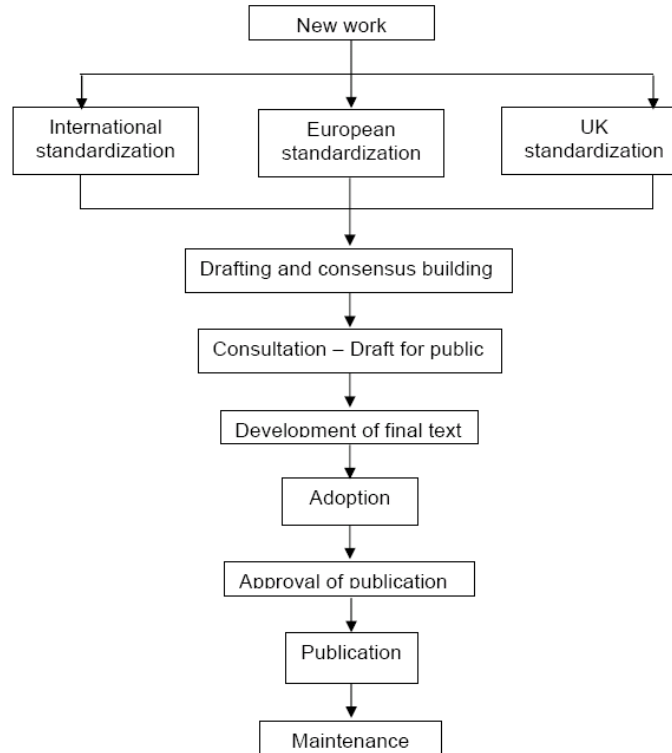
- BS
- BS EN
- BS EN ISO
- BS IEC
- Technical reports
- Technical specifications
- PAS

## Typical control and time to development over BSI standards offerings



- Fast, flexible, consensus driven standard suitable for certification purposes
- Client sponsored solution, developed for market needs
- Endorsed by BSI and co-branded with clients
- Developed in 9 to 12 months
- Potential for submission into formal national standards (i.e. BS or ISO) as a seed document

# Stages of Development



# Is it worthwhile to Standardize?

“The British Standards Institution, as the UK national standards body, is already engaged with the business community to help all understand the commercial benefit for British businesses of UK leadership in making standards. The Technology Strategy Board and Research Councils play a powerful role supporting innovation and new technologies in the UK. They too need to reinforce at every turn the importance of the UK setting standards if we are to deliver the products of UK research to market faster and with real global competitive advantage. ”

“Standards play a vital role in bringing new ideas to market faster. They are the priceless ingredients that underpin the dissemination of all emerging technologies. They are a form of knowledge – setting out a way forward for new technologies as they are being developed. They define terminology and shape principles and processes for industry to rally round with confidence. As we see in all walks of life, those who set the agenda often enjoy a clear advantage over those who simply follow.”

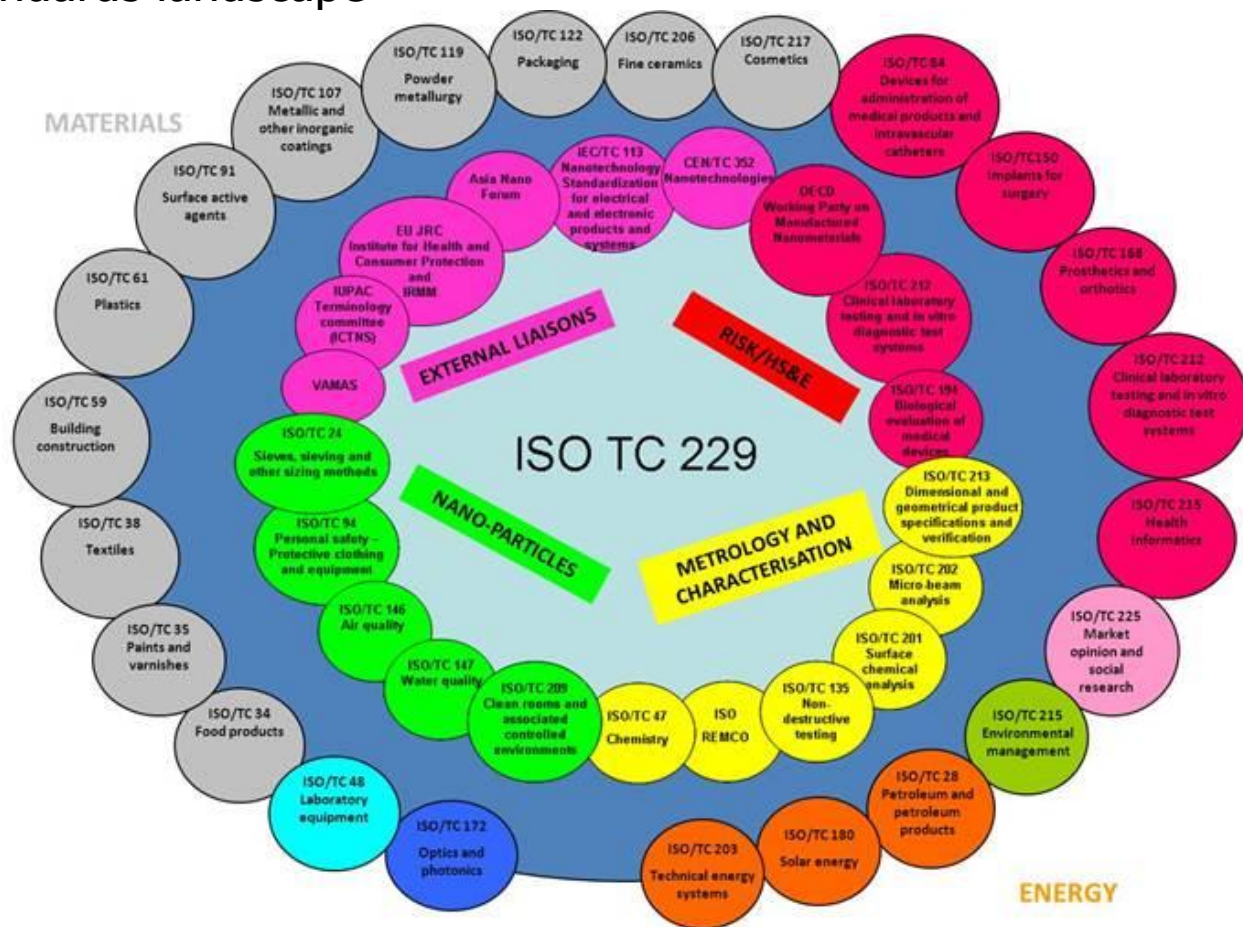
## NO STONE UNTURNED



[No stone unturned: in pursuit of growth - Lord Heseltine review](#)



# Nano Standards landscape



# Nanotechnology in standards.

Technology	Use Application	Known Manufactured Nanomaterials
<b>Additives within diesel fuel for HGVs</b>	Trucks and buses	Cerium oxide
<b>Biocides</b>	Nanosilver (and, to a lesser extent, other nanomaterials) used in a wide array of applications, including medical instruments, pharmaceuticals, textiles, domestic appliances, antimicrobial agents/coatings, biocidal cleaning products (silver nanoparticles)	Nanosilver, various metal oxides, nanostructured biopolymers
<b>Flame retardants</b>	More cost-effective flame retardant for various materials. For instance, nanoclays (sometimes with CNTs) are best used with ABS plastic. Magnesium hydroxide specified in reference #7 is best used with paraffins.	Nanoclays, CNTs, aluminum-hydroxide, magnesium hydroxide, triphenyl phosphate
<b>Batteries</b>	Automobiles and portable electronics	Nano-structured Lithium; Carbon nanotubes;
<b>Additives in Tyres</b>	Automobiles and trucks	silicon dioxide; multi-walled carbon nanotubes; carbon black
<b>Insulation</b>	A variety of current nanotechnology approaches include aerogels and thin film coatings, designed to reduce heat transfer. Enhanced foams with improved insulation properties and aerogel replacements for windows are being researched	Aerogels (carbon black and silica-based); quantum dots (Cadmium selenide); aluminium oxide
<b>Photovoltaics</b>	anti-reflective and/or self-cleaning capacity coatings for traditional solar cells (titanium dioxide, silicon dioxide), quantum dots in nanocrystal solar cells (lead selenide or cadmium telluride), building integrated photovoltaics (glass application of cadmium selenide, zinc oxide)	Photovoltaics
<b>Lighting</b>	Depending upon the desired color and heat of light, varying sizes and nanostructured semiconductors are used.	cadmium selenide, cadmium sulfide, indium arsenide, indium phosphide, cadmium selenide sulfide
<b>Water treatment and purification</b>	antimicrobial treatment to wastewater (metal oxides), water purification (nanopolymers), catalysis of pollutant breakdown (metal oxides)	Water treatment and purification
<b>Nano-zero-valent iron for environmental remediation</b>	Iron corrosion chemistry has been put into productive use in the dechlorination of organic solvents, detoxification of pesticides, immobilization of metals and transformation of fertilisers	Zero valent Iron nps
<b>Lightweighting</b>	Nanocomposites are valued in automotive applications for their improved physical properties and their ability to produce parts with reduced weight	CNTs, aerogels

# Nano-materials in consumer products

- There are a number of ISO Technical reports and Technical specifications, cover the issues surrounding Nano Safety and Risk.
- prEN/TS Nanotechnologies — Guidance for the responsible development of nanotechnologies
  - This TS provides a guidance for the responsible development of nanotechnologies taking into account:
    - Board Accountability;
    - Stakeholder Involvement;
    - Worker Health and Safety;
    - Benefits to and Risks for Public Health, Safety and the Environment;
    - Wider Social and Ethical Implications and Impacts;
    - Engagement with Business Partners;
    - Transparency and Disclosure.
  - But does not account for Labelling which is...

# Nano-materials in consumer products

- Labelling consumer products gives vital information to the public.
  - Provide information and traceability of their use. Labelling provides information to the consumer at the time of purchase.

**PAS 130:2007 Guidance on the labelling of manufactured nanoparticles and products containing manufactured nanoparticles**

**PD CEN ISO/TS 13830:2013 Nanotechnologies. Guidance on voluntary labelling for consumer products containing manufactured nano-objects**

# Nano Standards Highlights

- Cellulose nanomaterials:

- Back in 2014 there was a number of events identifying the technical barriers in the commercialization of cellulose nanomaterials with expert input from user communities.
- Typical lateral dimensions are 5–20 µm.
- Cellulose nanomaterials are materials in the nanoscale that are either manufactured by breaking down feedstocks such as plants, other cellulose materials, or produced directly by living organisms.
- A few companies already produce Cellulose nanomaterials containing products.
- Rather than delaying standards development until knowledge accumulated with market maturity is available

# Nano Standards Highlights

- Antibacterial silver nanoparticles

- Antibacterial silver nanoparticles probably one of the most common known and used it has never been standardised.
- Silver nanoparticles are releasing more silver ions when comparing with non-nanoscale silver particles.
- There is no appropriate standardization to specify antibacterial properties for silver nanoparticles, thus most manufacturers or business owners of antibacterial silver nanoparticle have been used existing antibacterial test standards to evaluate antibacterial properties.:
  - **BS ISO 22196:2011** Measurement of antibacterial activity on plastics and other non-porous surfaces
  - **BS EN 14349:2004** Chemical disinfectants and antiseptics. Quantitative surface test for the evaluation of bacterial activity of chemical disinfectants and antiseptics used in the veterinary field on non-porous surfaces without mechanical action. Test method and requirements
- Although antibacterial products using silver nanoparticle are widely distributed in the market, most antibacterial products have been sold without providing efficacy test result.

# Nano Standards Highlights

- Magnetic Nanoparticles

- Identifies emerging applications for magnetic nanoparticles (MNPs) in cancer therapy and drug delivery, and the subsequent importance of the standardisation of magnetic nanoparticles.
- MNPs are currently being employed in a wide range of biomedical applications including bioassays, cell sorting and purification, medical imaging, drug delivery and hyperthermia therapy.
  - Existing standards development work in Biotechnology and Health informatics.
- Companies are already producing and using magnetic nanoparticles, these are expected to benefit directly from standardization work within this field.

# Nano Standards Highlights

- Graphene

- The new wonder 2D material discovered at University of Manchester.
- Not except from Standards developments:
  - IEC developing terminology based publications.
  - Domains and defects.
  - Conductivity.
  - Blank details.



# So where are all these standards being developed?

- ISO/TC229 Nanotechnology
  - JWG 1 Terminology and nomenclature, linked to IEC/TC 113
  - JWG 2 Measurement and characterization, linked to IEC/TC 113
  - WG 3 Health, Safety and Environmental Aspects of Nanotechnologies
  - WG 4 Material specifications
- CEN/TC 352 Nanotechnologies
  - CEN/TC 352/WG 01 Measurement, characterization and performance evaluation
  - CEN/TC 352/WG 02 Commercial and other stakeholder aspects
  - CEN/TC 352/WG 03 Health, safety and environmental aspects
- IEC Technical Committee 113 "Nanotechnology Standardization for electrical and electronic products"
  - JWG 1 Terminology and nomenclature, linked to ISO/TC 229
  - JWG 2 Measurement and characterization, linked to ISO/TC 229
  - WG 3 Performance assessment
  - WG 7 Reliability

# What are the implications within Europe?

- CEN/TC 352 Nanotechnologies

- **M/461 "Standardization activities regarding nanotechnologies and nanomaterials"**
  - **16 work items**

- **Other regulations in question**

- **Cosmetics Regulation 1223/2009** (definition of nanomaterial 2014?)
- **Medical devices - Regulation proposed in Sept 2012** (devices incorporating or consisting of nanomaterial are proposed to be in class III (highest class) unless the nanomaterial is encapsulated or bound in such a manner that it cannot be released into the body (discussion started in EP and Council))
- **Food Regulation 1169/2011** (definition of "engineered nanomaterial" included, entry into force Dec 2014)
- **Food additives Regulation 231/2012** (update to adapt technical and scientific progress in nano field (?) )

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...making excellence a habit.™

Any  
Questions?

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