

BUSINESS PLAN

CEN/TC 23

TRANSPORTABLE GAS CYLINDERS

EXECUTIVE SUMMARY

CEN/TC 23, Transportable Gas Cylinders, is involved in the development of standards for pressure receptacles, including gas cylinders, their fittings and characteristics relating to their manufacture and use. The scope does not include LPG cylinders, covered by CEN/TC 286 or, non-refillable cartridges covered by CEN/TC 157 or containers for cryogenic gases which are covered by CEN/TC 268.

Business environment

The 99 documents published by CEN/TC 23 (including Amendments) are extensively used throughout Europe and the signatories of the RID¹ and ADR². Internationally, amongst others, Singapore has demonstrated confidence in the technical content of the standards by adopting some of them as national standards. The principal users of these standards have a global perspective and seek global harmonisation using ISO standards and EN ISO standards.

Benefits

Having international standards, which are recognised in regulations, enables pressure receptacles to be accepted for use in more than one country. Without such recognized standards countries impose their own national standards, which are often more than is technically necessary for essentially the same pressure receptacle, thus restricting their movement across national boundaries. This represents inefficiency in the use of resources.

The main objective of the committee's work is the production of a comprehensive suite of modern, high-quality standards covering the design, manufacture and testing of pressure receptacles and their fittings, as well as providing a set of standards for their filling, inspection, maintenance, testing and operational performance. The priorities are to ensure that the standards are available for the most commonly used types of pressure receptacles and valves, whilst also taking great care to use the best current technology to make the standards as state-of-the-art as is achievable.

Standards are published and adopted into the RID and ADR for construction requirements and test methods for transportable gas cylinders for the transportation of gases/dangerous goods within Europe and beyond e.g. Kazakhstan, Morocco, Nigeria, Tajikistan and Uzbekistan

Priorities

The TC has essentially completed its original programme of work but is now engaged in replacing many of the EN standards by EN ISOs, as well as the creation of new standards for the next generation of gas cylinders, through its close relationship with ISO/TC 58.

¹ Regulations concerning the International Carriage of Dangerous Goods by Rail (RID), appearing as Appendix C to the Convention concerning International Carriage by Rail (COTIF), Vilnius, 3 June 1999, as amended

² Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), Geneva, 30 September 1957, as amended

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CEN/TC 23 has a close working relationship with the bodies responsible for the RID and ADR and >40 of its standards are referenced in these regulations.

1 BUSINESS ENVIRONMENT OF THE CEN/TC

1.1 Description of the Business Environment

The following political, economic, technical, regulatory, legal, societal and/or international dynamics describe the business environment of the industry sector, products, materials, disciplines or practices related to the scope of this CEN/TC, and they may significantly influence how the relevant standards development processes are conducted and the content of the resulting standards:

1.1.1 General information regarding the sector and product

The industrial and medical gas market comprises a small number of specialist gas suppliers feeding a large number of users, ranging from small workshops to major companies. Gas cylinders have been the subject to national legislative controls for over a century and their long life means that there is a huge number of cylinders manufactured under these national rules.

International governmental agreements applying to the cross-border transport of gases are well established. These cross-border agreements have now been incorporated into an obligatory European Directive (2008/68/EC)³ and therefore into national regulations. This has provided a strong incentive for the generation of supporting technical standards at the European level. Transportable gas cylinders, their fittings and the procedures governing their use in the field are subject to continuous development aimed at improving gas carrying efficiency without compromising on safety. The standardization process has an important role to play in achieving this balance.

The term pressure receptacle is defined in the international regulations for the transport of dangerous goods. It is a collective term that includes the following types of pressure receptacle which are in the scope of CEN/TC 23:

- Cylinders are transportable pressure receptacles of a water capacity not exceeding 150 litres;
- Bundles of cylinders are assemblies of cylinders that are fastened together and which are interconnected by a manifold and transported as a unit. The total water capacity shall not exceed 3000 litres except that bundles intended for the transport of gases of Division 2.3 shall be limited to 1000 litres water capacity;
- Pressure drums are welded transportable pressure receptacles of a water capacity exceeding 150 litres and of not more than 1000 litres, (e.g. cylindrical receptacles equipped with rolling hoops, spheres on skids);
- Tubes are transportable pressure receptacles of seamless or composite construction having a water capacity exceeding 150 litres and of not more than 3000 litres;

Notwithstanding the capacity limit for tubes of 3000 litres in the international regulations for the transport of dangerous goods, work is in hand to develop standards for composite tubes of much larger capacities.

³ DIRECTIVE 2008/68/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 24 September 2008 on the inland transport of dangerous goods

Gas cylinders are, in a general sense, small transportable containers for substances stored under pressure. The uses for gas cylinders vary from the transport and storage of relatively low value commodities like compressed air, to highly refined and very expensive gases (which may have a variety of different properties, e.g. toxic, corrosive, etc.) for specialist use, such as in the semiconductor industry, which are sold and shipped in small quantities.

Due to the materials used in their construction, often the weight of a cylinder far outweighs its gaseous content. Industry balances the requirement for efficiency in manufacturing against the need to improve the customer experience, for example, by making cylinders as light as practical (by reducing wall thickness, using high strength materials, etc.). On the other hand, there must be a sufficient safety margin to avoid exposing workers and the general public to unacceptable dangers. Valves and other fittings must be suitable for the purpose and meet stringent safety requirements. All metal cylinders last, in most cases, for many decades and must be operated and maintained in a proper way to retain their good properties and safety. Whilst composite cylinders may have a specified design life e.g. 15 or 30 years.

Most of the standards in this field address these issues and are thus safety related.

The definition of gas cylinder types is given below:

- Type 1 cylinder: all metal cylinder;
- Type 2 cylinder: hoop wrapped cylinder with a load-sharing metal liner and composite reinforcement on the cylindrical portion only;
- Type 3 cylinder: fully wrapped cylinder with a load-sharing metal liner and composite reinforcement on both the cylindrical portion and dome ends;
- Type 4 cylinder: fully wrapped cylinder with a non-load sharing liner and composite reinforcement on both the cylindrical portion and the dome ends;
- Type 5 cylinder: fully wrapped cylinder without a liner and with composite reinforcement on both the cylindrical portion and dome ends.

1.1.2 Interested parties in the standardisation process

In addition to the producers, fillers and distributors of gases, the manufacturers of the transportable gas cylinders and their fittings have a key interest in the standardisation process. Regulatory agencies and testing/certification bodies that have enforced the existing national requirements also have a significant interest in this work.

Major stakeholders in this field are pressure receptacle and valve manufacturers, fillers and distributors, regulatory authorities and inspection bodies. Whilst manufacturers and pressure receptacle fillers are well represented by trade associations, the end users of gases form a very heterogeneous group. They are not organized in any tangible way and are thus hard to reach as stakeholders. However, the law protects their interests and CEN/TC 23 is grateful for the participation in the standardization process by the stakeholders, including representatives of the regulatory authorities. Above all, the stakeholders want safe pressure receptacles and general market forces require that they are also efficient and cost-effective.

1.1.3 Future requirements

The market in transportable gas cylinders comprises a mixture of traditional product types, developments in these and new product types in novel materials. Technical requirements for the traditional product types are generally well established but the specifications need to be capable of accommodating technical developments. In general, the TC is seeking to follow the policy of ISO by developing performance-based standards. For the novel materials test work has been necessary to establish the validity of test methods before inclusion in the standards.

1.1.4 Legal factors

1.1.4.1 At the European level, cross-border transport of dangerous goods has been subject to the RID/ADR agreements for many years. Non-mandatory European directives have also existed covering the design and manufacture of the main cylinder types since the mid-1980's. The RID/ADR is now following the well-established practice of supplementing the technical requirements contained in the texts with references to CEN or ISO standards. The Transport of Dangerous Goods Directive (2008/68/EC) has incorporated the RID/ADR agreements into EU law, and the standards included in the RID/ADR are the route for compliance with the law. More than 40 standards from CEN/TC 23 have been referenced so far.

1.1.4.2 Transportable Pressure Equipment Directive (TPED) 2010/35/EU⁴, covers aspects related to the creation of a single system of approvals for cylinder manufacturing and periodic in-service inspections of the cylinders and allows free circulation and use for transportable pressure equipment within the EU, EEA and Switzerland. Note that the UK has left the European Union, and has recently introduced new legislation for Transportable Pressure Equipment (TPE) product placed on the UK market (excluding Northern Ireland).

1.1.4.3 An expanding application for pressure receptacles is for the high-pressure storage of fuel gas for automotive applications, for example compressed natural gas (CNG), is popular in many countries as a fuel for cars, trucks and buses. Hydrogen is also rapidly gaining in popularity, for example, hydrogen fuel cell electric vehicles (FCEVs), and hydrogen injection vehicles, which provide clean propulsion technology that power increasing numbers of Zero & Ultra Low Emission Vehicles (ULEV).

Although this business plan focuses mainly on transportable pressure receptacles, it should not be forgotten that pressure receptacles are an economical means of storing gases, often at high pressure, and many are used in static applications, such as, for storage or as receivers to absorb pressure fluctuations. A transportable pressure receptacle may be used in a static application but the owner/user is responsible for ensuring that it is installed and maintained in accordance with the appropriate National or International Regulations. For the use of such pressure receptacles in such applications it is recommended that the equipment provider and manufacturer is consulted.

1.1.5 International trade and standardisation aspects

At the Global level, transport of dangerous goods is covered by the UN "Recommendations on the Transport of Dangerous Goods, Model Regulations" (so called "Orange Book"). These Model Regulations form the basis for the world-wide regulations for air and sea transport of dangerous goods as well as land transport in Europe and beyond covered by RID and ADR. The content for gases includes ISO pressure receptacle standards and more will be included as they are published. Parallel ISO/CEN voting has been used where possible and common standards are gradually being achieved. The adoption of UN text into the ADR and RID coupled with the use of EN ISO standards is delivering the maximum harmonisation of European and global standards and practices.

⁴ DIRECTIVE 2010/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 June 2010 on transportable pressure equipment and repealing Council Directives 76/767/EEC, 84/525/EEC, 84/526/EEC, 84/527/EEC and 1999/36/EC

1.2 Quantitative Indicators of the Business Environment

The following list of quantitative indicators describes the business environment to provide adequate information to support actions of the CEN/TC:

Detailed market statistics are not publicly available; however the market may be characterised as follows:

- The gas distribution business is supplied by several multinational companies, together with a large number of small, typically specialist, suppliers; Cylinder manufacture for use in general applications is carried out by approximately 10 companies, producing over 3 000 000 high pressure cylinders per annum;
- A total of in excess of 50 000 000 cylinders are estimated to be in circulation in CEN member countries (including cylinders for breathing apparatus and for fire extinguishers); Manufacturing industry relies, to a greater or lesser extent, on the use of industrial gases. Safe and economical gas cylinders are therefore a key part of the infrastructure of European industry.
- Industrial gases in cylinders are used extensively for pharmaceutical and diagnostic purposes as well as for calibrating devices such as breath alcohol meters and atmospheric monitors, thus contributing to the healthcare and regulation of modern society.

2 BENEFITS EXPECTED FROM THE WORK OF THE CEN/TC

2.1 Economical factors

The main stimulus for the CEN work is to establish a uniform high basis of safety in the transport and use of gases. Economic and sustainable benefits should arise through harmonisation of the market in cylinders, and the ability to move cylinders between markets, however this has not been quantified. These benefits have given a significant motivation to industry's efforts in developing harmonised standards. In addition, standardization work will enable the development of lighter weight cylinders, which will lead to economic and environmental benefits through reduced raw material and transport in use costs.

2.2 Realisation of objectives

The realised objectives will:

- support a transition to a legal framework based on essential requirements supported by technical standards;
- assist free trade by the harmonisation of manufacturing and testing requirements and procedures for in-service use;
- in conjunction with legislative developments establish the confidence of the national competent authorities in foreign inspection regimes;
- provide a common set of European standards, which will assist in the formulation of global standards through ISO;
- develop European Standards that contribute to the three pillars of economic, environmental, and societal sustainability

3 PARTICIPATION IN THE CEN/TC

All the CEN national members are entitled to nominate delegates to CEN Technical Committees and experts to Working Groups, ensuring a balance of all interested parties. Participation as observers of recognized European or international organizations is also possible under certain conditions. To participate in the activities of this CEN/TC, please contact the national standards organization in your country.

4 OBJECTIVES OF THE CEN/TC AND STRATEGIES FOR THEIR ACHIEVEMENT

4.1 Defined objectives of the CEN/TC

4.1.1 The TC will elaborate a set of European Standards in the Transport (of dangerous goods) and Pressure Equipment sectors on:

- the design, manufacture and testing of transportable gas cylinders and other types of pressure receptacles;
- design and testing of cylinder valves and fittings and dimensions for interchangeability;
- operational requirements, including filling conditions, inspections at time of fill, periodic inspection, cylinder identification and specific applications.
- materials compatibility

These standards will cover all applications except cylinders dedicated for LPG use and cryogenic receptacles for deeply refrigerated liquefied gases.

4.1.2 It will produce standards that are suitable for adoption into the RID/ADR. Where technical advances are considered to justify modifications to RID/ADR these will be clearly identified.

4.1.3 It will adjust the work programme to meet market needs and the needs of the TPED and the PED⁵, if such a need becomes apparent.

4.1.4 It will work in coordination with ISO when possible, and to align as closely as possible where technical differences are necessary.

4.2 Identified strategies to achieve the CEN/TCs' defined objectives.

4.2.1 Summary

Note In the following summary, the details relating to the progress of work were correct at the time of compiling this update to the Business Plan.

The work undertaken by CEN/TC 23 comprises 99 published CEN standards of which >60 are EN ISO standards. There are 11 work items in progress but only two are EN standards. Those EN standards are justified by specific European requirements. Each work item has been allocated a project leader including a European project leader when the work under the Vienna agreement is under the leadership of a non-European. These statistics demonstrate the policy that where

⁵ DIRECTIVE 2014/68/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 May 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment

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possible similar existing or revised ISO standards will be adopted as European Standards, either under the Vienna Agreement or by UAP.

A close cooperation with ISO/TC 58 and its sub-committees has proven to be very beneficial and efforts to further increase the alignment of standards developed by ISO and CEN will be undertaken notably during five-year reviews. The committees are partly manned by the same experts and all efforts to reduce duplicating meetings are appreciated.

An important inroad for the adoption of EN ISO pressure receptacle standards is the use of the ADR and RID as well as the United Nations Recommendations on the Transport of Dangerous Goods – Model Regulations and the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

An important consideration is to be responsive to the needs of legislators who are increasingly relying on references to standards to provide the definitive detail to the regulations. Therefore, the policy is to develop and maintain a close working relationship with the associated governmental experts.

Generally, the TC and its working groups have responded positively to the CEN time scales and do try to meet the target times. However, as there are relatively few experts, some delays can occur. In many instances these are due to genuine difficulty in reaching consensus and sometimes there are problems finding suitable meeting times and venues. Experts are facing increasing difficulty in finding the time to attend standards working groups but it is pleasing that remote meeting access is being made available and indeed encouraged.

Hitherto, with any specific European requirements, i.e. those relating to directives and mandates, or established European technical practices not yet adopted at ISO were covered in European Annexes (e.g. NA, ZA's etc.). This has been declared no longer possible since the global relevance policy of ISO and the Vienna agreement require that any market variations are shown within the ISO standard.

Drafts for circulation at the Enquiry stage and the Formal Vote stage are prepared in 3 languages. At all other stages of review, comment and discussion at meetings the work is carried out in the English language only.

Meetings of the TC have recently been infrequent since the significant developments are now mostly at the ISO level. In general, the WG's resolve their difficulties at the WG level and most matters can be dealt with in this way or by correspondence at the TC level.

4.2.2 Structure of the TC

At the time of writing the structure of the TC is as follows:

- CEN/TC 23/WG 11 Cylinder design - Seamless steel cylinders
- CEN/TC 23/WG 12 Cylinder design - Welded/brazed cylinders excluding cylinders for LPG
- CEN/TC 23/WG 15 Cylinder design - Non refillable cylinders
- CEN/TC 23/WG 16 Fully wrapped composite cylinders

- CEN/TC 23/WG 20 Cylinder design - Fittings

- CEN/TC 23/WG 31 Operational requirements - Filling conditions
- CEN/TC 23/WG 32 Operational requirements - Inspection and periodic testing
- CEN/TC 23/WG 33 Operational requirements - Identification of cylinders and contents

- CEN/TC 23/WG 35 Operational requirements - Manifold receptacles

The structure is flexible to allow new WGs to be introduced as required and for WGs to be closed when their work has been completed. Support for CEN/TC 23 and its WGs from National Standards Bodies, and in particular; BSI, AFNOR and DIN, is very much appreciated.

4.2.3 Liaisons

The following liaisons currently exist at the TC level:

Internal:

- CEN/TC 70; Manual means of fire fighting equipment
- CEN/TC 79; Respiratory protective devices
- CEN/TC 286; Liquefied petroleum gas equipment and accessories

External:

- European Industrial Gases Association (EIGA)
- European Cylinder Manufacturers Association (ECMA)
- Liquid Gas Europe (LGE)

4.3 Environmental aspects

Type 1 (all metal) Gas cylinders are made for repeated use and typically have a life of around 50 years. The traditional construction from steel and aluminium alloy means that recycling at the end of life is easily arranged. Even non-refillable cylinders made for a single use, can be recycled without difficulty.

The TC will incorporate requirements for protection of the environment when drafting new standards or when systematic revisions are being undertaken, in-line with the UN 17 Sustainable Development Goals (SDGs), as explained below.

- *“The 2030 Agenda for Sustainable Development, adopted by the United Nations in 2015, provides a shared blueprint for peace and prosperity for people and the planet. At its heart are the 17 UN Sustainable Development Goals (SDGs). which are an urgent call for action for a global partnership to address social imbalances, develop a sustainable economy, and fight against climate change.”*
- *The aim is to “develop European Standards that contribute to the three pillars of economic, environmental, and societal sustainability and provide long-term solutions to achieve the SDGs. Concretely, they can serve many uses: for example, they can support companies whose sustainability reporting must comply with the EU Corporate Sustainability Reporting Directive (EC proposal COM(2021) 189) to identify the correct European standards which, when applied, can help in that reporting task. In the framework of the twin digital and green transition for Europe, we are fully committed to the global implementation of the SDG. This is why, it is indicated as a priority by the CEN and CENELEC Strategy 2030”*
- *“CEN and CENELEC have started mapping the standards that make the most significant contribution to the SDGs in the European context (building on the work at the international level already done by ISO and IEC). This has been envisioned as a tool to raise awareness among the European standardization community on SDGs and on the value of European Standards in support of the EU strategy to build resilience, as we embark on the twin green*

and digital transitions. On the long term, this interactive mapping aims to reinforce, but also to move beyond, the more obvious links between the SDG and standards to explore new opportunities and strengthen synergies between stakeholders.”

CEN/TC 23 are committed to actively supporting Sustainable Development

Further, to support this activity an EIGA Document has been adopted: Doc. 178/20 Environmental Aspects of Standardisation. This document provides guidance on inclusion of environmental aspects in standardisation activities. It is intended for use by Convenors and Working Group Experts involved in the preparation of international standards (CEN and ISO) and provides guidelines for inclusion and consideration of environmental aspects.

4.4 Hydrogen Economy

During the CEN/TC 23 Plenary Meeting, March 2022, the rapidly developing Hydrogen Economy was discussed. It was agreed that further discussions were required and a ½ day workshop to understand the views of the members of CEN/TC 23, which has now taken place. The main objectives of the Workshop were to:

- Understand CEN/CENLEC's commitment to the hydrogen economy;
- Recognize the applicability of CEN/TC 23's current portfolio with regards to the hydrogen economy, and;
- Identify opportunities for CEN/TC 23 to provide additional support and benefits to the Hydrogen Economy i.e. mobility, storage and transport of hydrogen.

An overview of the key outputs, from the Workshop, are presented below:

- Timelines and schedules are key to the H₂ Economy i.e. removal of obstacles is gathering pace but must ensure that an acceptable quality of standards is maintained
- CEN/TC 23 can add safety and value to the H₂ Economy
- Strong consensus from all attendees to extend the visibility of CEN/TC 23 to Key Hydrogen Economy Stakeholders
- CEN/TC 23 can use their expertise across different market sectors and applications

Next steps are to extend discussions with CEN/CENELEC and to have a 2nd CEN/TC 23 Hydrogen Workshop, with a view to establishing their better integration into the Hydrogen Economy.

5 FACTORS AFFECTING COMPLETION AND IMPLEMENTATION OF THE CEN/TC WORK PROGRAMME

5.1 WG's are generally well supported by relevant manufacturers and gas companies. It is pleasing to report that the Joint Meeting Standards Working Group have adopted EN and EN ISO standards from CEN/TC 23 without issue for some years now. For some time there was no CEN Consultant advising the Standards Working Group, as the European Commission redefined the role and handed administration to EY. DG Move subsequently announced the withdrawal of its mandate (and hence any funding) for the Consultant. The Joint Meeting asked industry to fill the gap and it is pleasing to report that agreement was reached between ECMA, EIGA and LGE for an equitable sharing of costs, and a Standards Advisor has been appointed.

Note1: EY has been assigned by the European Commission a Technical Assistance contract to set up and manage a network of harmonised standards consultants – so-called “HAS Consultants.

Note 2: DG MOVE - DG for Mobility and Transport The Commission's Directorate-General for Mobility and Transport is responsible for EU policy on mobility and transport”

5.2 Much of the detailed drafting is carried out by a small number of individual industry experts. Progress is therefore dependant on the limited time available to these experts, and the necessary demands of their employers. However, it is pleasing to report that accessibility to WG Meetings by virtual conferencing has allowed increased attendance at some WG Meetings. It is expected that this will become the business norm for WG Meetings, albeit that some face-to-face meetings will still be needed.

5.3 Changes to key personnel through retirement or redeployment can seriously affect the progress of a draft, particularly when this happens suddenly and no advance planning for a change has been possible. Most significantly this applies to project leaders, but changes to personnel in the Secretariats, the Consultants and at CEN/CS can also affect progress.

5.4 As drafted the texts reflect current good practice within the industry, however occurrences in the field sometimes necessitate change. If technical changes are then needed to the draft standards this can require additional consultations and hence delays.

5.5 Periodic (biennial) changes to the directives relevant to the transport of dangerous goods have required back-staging of work to reflect the changed essential requirements. These have caused delays and future changes would equally result in delays to the publication of affected standards.

5.6 Former difficulties caused by complex and sometimes incompatible I.T. requirements for the drafting of standards that placed an unwelcome burden on project leaders and drafters seem to be largely in the past.