Kommission Arbeitsschutz und Normung

26e

Standardization
Relating to the
Pressure Equipment
Directive



Standardization Relating to the Pressure Equipment Directive (97/23/EC)

KAN Report 26e

Word of thanks

The Secretariat of the Fachausschuss "Druckbehälter" - FAD (committee of experts for pressure equipment) thanks, in its capacity as the body conducting the project, the experts and representatives of the groups involved in the questionnaire for their constructive support in its completion.

It also wishes to thank all experts who contributed detailed specialist information during the interviews.

Particular thanks are due to Dr. Albert Hövel, Chief Executive of DIN, Cologne, and to the DIN Secretaries for their continued support and provision of information on the latest developments in standardization work pursuant to Directive 97/23/EC.

The "Kommission Arbeitsschutz und Normung" – KAN (Commission for Occupational Health and Safety and Standardization) is financially supported by the German Federal Ministry of Labour and Social Affairs.

Authors: Dipl.-Ing. Manfred Braun (Project management)

Dr.-Ing. Tiberius Schulz (Project execution)
Berufsgenossenschaft der chemischen Industrie

Geschäftsstelle des Fachausschusses "Druckbehälter" (FAD)

Edited by: Verein zur Förderung der Arbeitssicherheit in Europa e.V.

Published by: Kommission Arbeitsschutz und Normung (KAN)

Geschäftsstelle

Alte Heerstraße 111, 53757 Sankt Augustin

phone: +49 2241 231 3451 fax: +49 2241 231 3464 e-mail: info@kan.de homepage: www.kan.de

Overall production: Druckerei Plump oHG, Rheinbreitbach

ISBN 3-88383-616-8

April 2002

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The Commission for Occupational Health and Safety and Standardization (KAN) was founded in 1994 to assert German interests in OH&S matters, especially with regard to European standardization. KAN is composed of representatives of the social partners, the federal state and the Laender, the Hauptverband der gewerblichen Berufsgenossenschaften (HVBG, German federation of institutions for statutory accident insurance and prevention) and the German Standards Institute (DIN). One of KAN's tasks is to focus the public interests in the field of occupational health and safety and to exert influence on current and future standardization projects by delivering opinions on specific subjects.

KAN procures studies and expert opinions in order to analyse occupational health and safety aspects in standardization and to reveal deficiencies or erroneous developments in standardization work.

This study was based on the following task in hand:

Background

The Pressure Equipment Directive (97/23/EC) applies to the design, manufacture and conformity assessment of pressure equipment and assemblies with a maximum allowable pressure PS greater than 0,5 bar.

Pressure equipment includes vessels, piping, safety accessories and pressure accessories. As of 29 November 1999 pressure equipment marked with a CE symbol may be placed on the market in accordance with this directive.

In 1994, while Directive 97/23/EC was being drafted, the European Commission issued mandates concerning the directive. A CEN advisory committee then incorporated around 800 subjects related to four individual mandates in the list of standards to be mandated. Seven Technical Committees were assigned the task of preparing standards for plants and plant components (approximately 162 standards documents are currently being drafted for, for example, pressure vessels, steam boilers and piping), nine Technical Committees were asked to draw up product standards (16 standards documents are currently being drafted for, for example, fittings and flanges) and 21 Technical Committees were asked to prepare supporting basic standards (440 standards documents are currently being drafted for, for example, materials and welding). A "sector forum" for pressure equipment has been established in order to co-ordinate the work of the TCs (replacing BTS 2).

The European standards are based on the existing national regulations.

Objective of the Survey

It is intended to give an outline, with the aid of an expert survey, of the wealth of standards relating to Directive 97/23/EC. The survey aims to estimate the extent to which the product requirements presently stipulated in the German regulations have been taken into account in the European standards and where there is still a need for standardization at the European level.

Tasks

- Summary of the legal background and the structure of the (national and European) standards relating to the directive.
- Survey amongst the DIN secretaries responsible for work related to the directive (e.g. Standards Committee for Chemical Apparatus Engineering and Standards Committee for Piping and Steam Boilers) with regard to the standardization work currently underway and their opinion concerning the standards needed.
- Survey amongst the statutory accident insurance institutions' and the government's OH&S representatives responsible for work related to the PED and amongst the relevant trade associations, e.g. Association of Steam-Boiler, Pressure-Vessel and Piping Manufac-

- turers (FDBR), with regard to their opinion concerning the standards needed.
- Assessment based on the respondents' viewpoint of whether attention was paid to ensuring that the standardization conformed to the "German Consensus Statement" (Annex A).
- 5. Should the survey come to the conclusion that standards are needed or existing standards need to be revised in certain areas, a project description must be drawn up, taking into account the survey's conclusions and KAN's tasks.
- 6. Presentation of the conclusions in the form of a report.

KAN wishes to thank the authors for conducting the project and submitting the report, and the following experts for their support in assessment of the project:

Klaus-Peter Borsky Bayer AG, Leverkusen

Jürgen Dzudzek IG Metall, Duisburg

Dr. Albert Hövel DIN Deutsches Institut für Normung e.V., Köln

Eckhard Metze Sozialpartnerbüro Arbeitgeber in der KAN-Geschäftsstelle, Sankt Augustin Dr. Bernd Schürmann Hauptverband der gewerblichen Berufsgenossenschaften, Sankt Augustin

Dorit Zimmermann KAN-Geschäftsstelle, Sankt Augustin

The following summary of the study and the recommendations were adopted by KAN on 30 October 2001.

Summary

Legal Background

The legislative basis of the European product standardization relating to pressure equipment is Directive 97/23/EC, which is based on Article 95 of the EC Treaty (formerly Article 100a). It has been possible to apply this directive since 29 November 1999. When the transition period ends on 29 May 2002, the directive will come into full force.

On the basis of the programme proposed by CEN, the EU Commission issued a mandate (M/071) in August 1994, consisting of four individual standardization tasks for approximately 800

subjects (standards or parts of standards)¹. Consequently, the mandated standardization work began whilst Directive 97/23/EC was still being debated. The legal certainty necessary for the standardization was, however, not established until Directive 97/23/EC was adopted on 29 May 1997.

Structure of Standardization Relating to Directive 97/23/EC

At the European level, a total of 19 Technical Committees in CEN and 9 Technical Committees in ECISS² (European Committee for Iron and Steel Standardization) are involved in standardization relating to Directive 97/23/EC.

The standards relating to this directive are structured as follows:

- harmonized product standards: describing all aspects of a product (product type) (approx. 100 standards),
- harmonized supporting standards: describing certain working or test methods (approx. 200 standards) and

Approximately 100 standards projects for plants and plant components (standards concerning pressure vessels, steam boilers, piping, refrigerating systems, etc.), approximately 130 standards projects for product standards (standards concerning fittings, flanges, etc.) and approximately 570 standards projects for basic standards (standards concerning materials, welding, etc.)

² Some of the ECISS standards were later (1999/2000) designated as harmonized supporting CEN standards. Germany is represented on ECISS by the Iron and Steel Standardization Committee (FES) in the VDEh (German Iron and Steel Institute).

 harmonized supporting material standards: describing the parameters and properties of materials for pressure equipment (approx. 250 standards).

Harmonized supporting standards alone cannot lead to presumption of conformity. To be able to do so they must be applied in combination with harmonized product standards or Annex I of the Pressure Equipment Directive.

In addition, supporting basic or generic standards are to be drawn up for the non-harmonized area in order, for example, to describe how material tests are carried out (approx. 250 standards). Different safety strategies in the European states and changes to the proposals for the Pressure Equipment Directive during the preparation of the standards considerably delayed the standardization process in some cases.

There is currently an urgent need to complete the standards. This is because the EU Commission believes that the presence of harmonized standards at the end of the transition period will play a role in ensuring successful implementation of the Pressure Equipment Directive. The Commission's strategic objective is thus that the series of basic harmonized standards should be finished by 29 May 2002 at the latest. This places a great deal of pressure on the work presently underway

at CEN. Only around 50 standards had been listed in the Official Journal of the European Community upon completion of this study (18 July 2001).

Survey Procedure

Standardization relating to the Pressure Equipment Directive was analyzed using the following sources:

- standards, draft standards, working documents, documents produced by the CEN and ECISS standards bodies involved and the CEN Technical Board (CEN/BT), reports by the CEN consultant, Commission documents,
- Internet research (the European Commission's and CEN's websites),
- survey amongst the DIN secretaries with regard to the current status of standardization relating to pressure equipment,
- survey amongst the DIN secretaries and experts (manufacturers and manufacturers' associations, technical inspection organizations and registered bodies, operators' testing bodies, accident insurance institutions, operators, authorities) using questionnaires and
- interviews on specific topics with selected experts who play a significant role in standardization.

The following procedure was chosen for the survey amongst groups involved (DIN standards committees, manufacturers, operators, authorities, accident insurance institutions, committees of the HVBG (Federation of the Statutory Accident Insurance Institutions of the Industrial Sector), associations, test bodies and technical inspection organizations):

- Questionnaire-based survey amongst two groups:
 - experts who were asked to assess all aspects of standardization and
 - experts who were asked to provide statements or assessments concerning specific fields or standards/series of standards.
- 2. Interviews on specific technical topics with selected experts who play a significant role in standardization

Result of the Survey

Germany has not initiated any standardization regarding health and safety of workers at the workplace as part of the standardization relating to the Pressure Equipment Directive. However, some standards do contain provisions concerning health and safety of workers at the workplace.

Extensive parts of the German regulations concerning product requirements have

been taken up in the European standards. In some cases, there are gaps compared to the present national regulations. Special standards, e.g. for expansion tanks, and certain standards for plants and plant components sometimes differ from the safety strategy in basic standard prEN 13445 "Unfired pressure vessels".

In the experts' opinion, the following tasks must have priority in future standardization:

- Completion of the necessary harmonized standards, especially for pressure vessels (prEN 13445 "Unfired pressure vessels"), piping (prEN 13480 "Metallic industrial piping") and steam boilers (prEN 12952 "Water-tube boilers and auxiliary installations"; prEN 12953 "Shell boilers")
- 2. Once sufficient experience has been accumulated with the application of these standards, they should be revised since problems are already evident now but cannot be eliminated due to the lack of time and practical experience. Furthermore, individual parts of standards must be better coordinated in future in order to guarantee a coherent overall strategy and practicability and thus to ensure that the standards are accepted.
- 3. The scope of the above-mentioned series of standards should be in-

creased in the interim to include issues where there are gaps in the present versions of the standards compared to the national regulations.

The experts were unanimous in the opinion that new standards projects were not necessary in the majority of the CEN/TCs and ECISS/TCs analyzed. The exception to this was the area of piping, where all those questioned considered a new standard for plastic piping necessary. Since the series of standards only covers metallic piping, a new standard will be required in order to ensure a systematic approach.

KAN's Recommendations

Overall Assessment

Standardization related to Directive 97/23/EC is of considerable importance, especially since the transition period is due to lapse on 29 May 2002 and because of the economic significance of the pressure-equipment sector for the common market. This importance is made clear by the fact, for example, that approximately every tenth subject presently dealt with by CEN is directly or indirectly linked to Directive 97/23/EC.

The present report outlines the current status of the standardization in this field. The standards are still being developed: of the approximately 800 mandated

standards, around 460 European standards had been ratified and of those approximately 50 had been harmonized upon completion of this study (18 July 2001). This must thus be borne in mind in any conclusive assessment of the first versions of harmonized standards for pressure equipment, which will be available shortly. Only when experience has been accumulated with the application of the standards and they are revised, as will then be required, will it be possible to assess conclusively their practicability with regard to safety-relevant aspects. Having said that, there is already an evident need for action in some areas.

Action to be Taken by DIN

- Once the report has been published, DIN is requested to forward it to the German mirror committees so that the results are available to them when editing/revising the standards/draft standards.
- DIN is requested to remind its standards committees (FNCA, NARD, NAA, NDG; FNKä, FNFW, NAEBM, FNK, NA Tank and NA Gas) that those regulations governing health and safety of workers at the workplace which concern
 - safety-relevant information on assembly, commissioning, operation

- and maintenance, including inspection by the user,
- residual-risk information provided by the manufacturer on the basis of the risk analysis or
- information provided by the manufacturer regarding risks caused by improper use

should only be listed in the requirements for the drafting of instruction handbooks in accordance with Annex I, Section 3.4 of Directive 97/23/EC. As specified by the German Consensus Statement, other aspects of health and safety of workers at the workplace are not matters for standardization.

- 3. The DIN is requested to take action at the European level to ensure that the following standards/draft standards are revised or that the standards are rejected at the European level where appropriate, because they contain provisions concerning health and safety of workers at the workplace which are reserved to national legislation:
 - prEN 13458-3 "Cryogenic vessels
 Static vacuum-insulated vessels
 Part 3: Operational requirements (CEN/TC 268)" requires, for example, inspections before commissioning and periodic inspections, some of which are to involve a "registered body".

- WI 00268029 "Cryogenic vessels -Static non-vacuum-insulated vessels
 Part 3: Operational requirements" requires, for example, inspections before commissioning and periodic inspections, some of which are to involve a "registered body".
- DIN EN 378-3 "Refrigerating systems and heat pumps Safety and environmental requirements Part 3: Installation site and personal protection" applies to refrigeration units of and above certain minimum volumes (2.5 kg to 10 kg depending on the type of cooling agent) and contains extensive technical and organizational requirements which must continue to be reserved to the field of health and safety of workers at the workplace.
- DIN EN 378-4 "Refrigerating systems and heat pumps Safety and environmental requirements Part 4: Operation, maintenance, repair and recovery" contains extensive technical and organizational requirements which must continue to be reserved to the field of health and safety of workers at the workplace.
- prEN 13313 "Refrigerating systems and heat pumps - Competence of personnel" includes provisions con-

cerning the training and certification of the personnel responsible for health and safety of workers at the workplace (e.g. for installation, inspection, testing, commissioning, maintenance and repair). The standard also contains provisions concerning testing responsibilities within companies (e.g. for pressure vessels, piping or steam boilers).

- 4. DIN is requested in future standardization (e.g. in CEN business plans) to give priority to ensuring that
 - the necessary harmonized standards, especially for pressure vessels (prEN 13445 "Unfired pressure vessels"), piping (prEN 13480 "Metallic industrial piping") and steam boilers (prEN 12952 "Water-tube boilers and auxiliary installations"; prEN 12953 "Shell boilers"), are completed;
 - a premature revision process is commenced when sufficient experience has been accumulated with the application of these standards. Problems are already evident now but cannot be tackled due to the lack of time and practical experience. Furthermore, individual parts of standards must be better co-ordinated in future in order to guarantee a coherent overall strategy and practicability and thus to en-

- sure that the standards are accepted:
- the scope of the above-mentioned series of standards should be increased in the interim to include issues where there are gaps in the present versions of the standards compared to the national regulations.

Action to be Taken by the Federal Ministry of Labour and Social Affairs

 The Federal Ministry of Labour and Social Affairs (BMA) is requested to take action to ensure that the reference to DIN EN 378-3 and DIN EN 378-4 be removed from the Official Journal of the European Communities should the current revision of the two parts still retain extensive provisions concerning health and safety of workers at the workplace which do not supplement the requirements of the Pressure Equipment Directive.

Action to be Taken by the KAN Secretariat

 The KAN Secretariat is requested to give priority to ensuring that the content of the German Consensus Statement is taken into consideration in the European draft standards presently be-

- ing dealt with (CEN survey) for pressure vessels, piping and steam boilers.
- 2. The KAN Secretariat is requested to examine in detail, in a second step, if the standards which are currently in the formal approval process and those which have already been adopted in the above-mentioned areas contain provisions concerning health and safety of workers at the workplace.

Action to be Taken by the State, the Social Partners and the Accident Insurance Institutions

 The state, the social partners and the accident insurance institutions are requested to play an active role in European standardization so that the German Consensus Statement can be represented in the European standardization bodies.

1.1 European legislation governing technical harmonization

1.1.1 The New Approach and the Global Approach

The removal of barriers to trade represents an important objective towards the creation and completion of the Single Market as an economic area in which the free movement of goods, services, capital and labour is assured. Barriers to trade may arise in particular through differences between member states in their applicable laws, regulations and administrative provisions governing safety, health, environmental and consumer protection, and also through differences in the certification and inspection procedures for certain products and product categories.

The regulatory measures developed by the European Union for the elimination of barriers to trade are based upon the New Approach and the Global Approach.

The **New Approach** was defined in the 1985 Council Resolution concerning a new approach in the area of technical harmonization and standardization. It is based upon the following principles:

 harmonization of statutory provisions in the member states is limited to the

- definition of essential requirements which products distributed in the community must satisfy, in order to ensure that they may be distributed freely:
- the technical specifications of products which must satisfy the essential requirements ("basic safety requirements") contained in the directives are to be defined in harmonized European standards;
- application of the harmonized or other European standards remains voluntary, and the manufacturer is at liberty to employ other technical specifications in order to satisfy the essential requirements;
- where products are manufactured in accordance with harmonized standards, they are presumed to satisfy the corresponding essential requirements.
 The application of harmonized standards fulfils the requirement for presumption of conformity.

The Global Approach defines the general guidelines and detailed procedures for conformity assessment and CE marking in accordance with the New Approach directives. The Global Approach was defined by Council Decision 90/683/EEC, amended by Decision 93/465/EEC. With the Global Approach, an approach has been introduced in which conformity assessment is divided into a series of modules. These modules differ

according to the stage of development of the product (design, prototype, production), the nature of assessment (product or system-oriented examination), and the party performing assessment (manufacturer or third party). Manufacturers may choose between different conformity assessment procedures indicated in the directives to be applied.

1.1.2 Legislative basis for New Approach directives

The legislative basis for adoption or amendment of New Approach directives is Article 95 of the EC Treaty (as amended by the Treaty of Amsterdam; formerly Article 100a). In accordance with Article 251 of the EC Treaty, the legislatory procedure is initiated by a proposal by the European Commission. In its proposals, the Commission assumes, in accordance with Article 95 of the EC Treaty, a high level of protection in the areas of health, safety, and environmental and consumer protection. The directive is adopted by the Council and the European Parliament in accordance with the codecision procedure set forth in Article 251 of the EC Treaty.

The Pressure Equipment Directive is currently one of 21 Directives drawn up in accordance with the New Approach which make provision for CE marking of products (refer to the list in Annex 1).

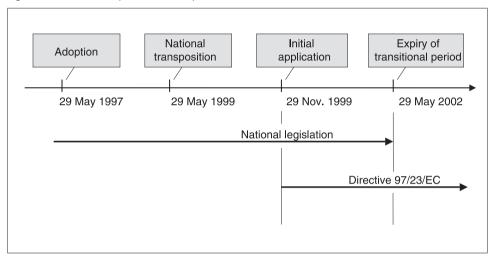
1.1.3 Simultaneous application of New Approach directives

The New Approach directives are hazard-oriented. As these directives may cover a broad spectrum of products and hazards, the essential requirements of the individual directives may overlap or supplement each other. The principle of simultaneous application of the applicable directives therefore applies; exceptions are special cases in which for example a directive more closely related to a certain product is given priority and the application of other directives restricted.

The principle of simultaneous application of directives generally necessitates a risk analysis for the product concerned, possibly in conjunction with an analysis of the intended purpose. The New Approach, the objective of which is protection of the public interest, is geared to product safety. Attention is drawn in this respect to the Directive on Product Liability (85/374/EEC), which is applicable to all products falling within the scope of the New Approach directives.

The New Approach directives and the Directive on Product Liability thus complement each other with respect to the assurance of product safety.

Fig. 1 Schedule of transposition and implementation of Directive 97/23/EC



1.1.4 Transposition of Directive 97/23/EC at national level

29 May 1999 has been declared the deadline for transposition by the member states of Directive 97/23/EC in accordance with Article 20 (see Fig. 1).

The 14th Ordinance regulating the German Equipment Safety Act (GSGV) is in preparation for transposition of Directive 97/23/EC in the Federal Republic of Germany.

In its statement issued on 22 July 1999 (BArbBl. 9/1999, p. 107), the Federal Ministry of Labour and Social Affairs (BMA) declared, with reference to the

case law of the European Court concerning the immediate effect of a failure to transpose directives by the deadline specified, that notwithstanding the entry into force of the Pressure Equipment Directive, pressure equipment and assemblies falling within the scope of Directive 97/23/EC may be placed on the market from 29 November 1999 to 29 May 2002 provided they meet the provisions of either § 3 of the German Equipment Safety Act (GSGV), or Directive 97/ 23/EC. From 30 May 2002 onwards, the placing of pressure equipment and assemblies on the market is to be governed exclusively by the 14th Ordinance regulating the German Equipment Safety Act.

1.2 European standardization governing technical harmonization

1.2.1 Harmonized European standards

According to the general definition contained in Directive 98/34/EC, European Standards are technical specifications approved by a recognized standardization body for repeated or continuous application, with which compliance is not compulsory. The competent standards organizations are:

CEN = European Committee for Standardization

CENELEC = European Committee for Electrotechnical Standardization

European Talasan

ETSI = European Telecommunications Standards Institute.

In accordance with the Internal Regulations of the above organizations, European standards must be transposed into national standards at national level by their members, the standards organizations (member countries), and conflicting or divergent national standards withdrawn within a certain period of time.

Harmonized European standards (referred to below as harmonized standards) are technical specifications which support the essential requirements of the

New Approach directives. Their essential features are the same as those of European standards in general:

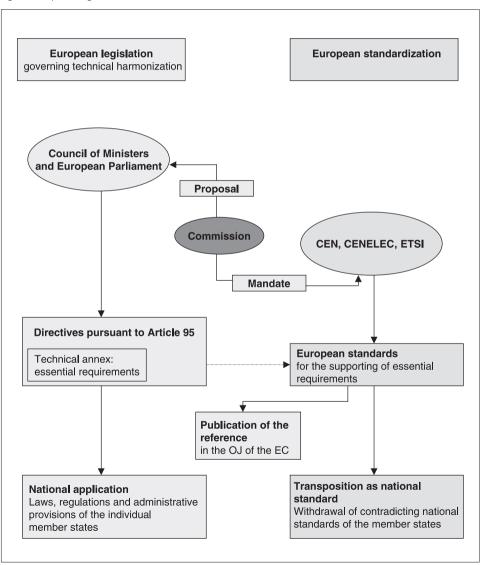
- The standards organizations CEN, CENELEC, ETSI are responsible for adoption.
- The standards are drawn up in observance of the general principles, in particular:
 - consensus of the parties involved, and
 - public enquiry and final voting with national weightings.
- Their application remains voluntary; transposition at national level and the withdrawal of conflicting or divergent national standards issued by members of the standards organizations is mandatory.

The status of a harmonized standard is subject to particular statutory conditions, however. The drafting and adoption of harmonized standards is based upon the general guidelines for cooperation between the European standards organizations and the European Commission reached on 13 November 1984. These guidelines contain a range of principles and obligations concerning standardization, including:

 the involvement of all interested parties (e.g. manufacturers, consumer organizations, trades unions);

1 Statutory framework

Fig. 2 European legislation and standardization in the area of technical harmonization



- the role of public authorities;
- the quality of the standards;
- consistent application of the standards throughout the Community.

The principles of standardization policy set forth in these guidelines were affirmed by the Council Conclusion concerning efficiency and accountability of European standardization adopted on 18 May 1998. The guidelines are currently being revised.

The status of a harmonized European standard within the scope of a New Approach directive is dependent, specifically, upon

- the standard being drawn up, revised or reviewed in response to a (formal standardization) mandate by the Commission pursuant to Directive 98/ 34/EC;
- the standard supporting the essential requirements in accordance with the state of the art;
- the reference of the standard being published in the Official Journal of the European Communities with reference to the directive (see Fig. 2).

Harmonized standards satisfy the requirement for presumption of conformity

with the essential requirements of the directive. Should the manufacturer apply only part of a harmonized standard, or should the applicable harmonized standard not cover all essential requirements, the presumption of conformity applies only to the scope in which the essential requirements are covered by the applied standard (or parts).

The manufacturer is at liberty to apply specifications other than harmonized standards, or to create conformity with the directive directly on the basis of the essential requirements. In this case, the requirement for presumption of conformity is not satisfied, and the manufacturer must demonstrate conformity with the essential requirements of the directive.

1.2.2 Revocation of the presumption of conformity

New Approach directives contain a safeguard clause by which a harmonized standard can be challenged. Should a Member State or the European Commission be of the opinion that a harmonized standard does not fully satisfy the essential requirements, the reasons may be stated and the Standing Committee established by Article 5 of Directive 98/34/ EC encharged with the procedure.

2 Standardization structures within the scope of Directive 97/23/EC

2.1 Issuing of mandates, project subjects

The following procedure was applied for issuing of the mandate for standardization activity within the scope of Directive 97/23/EC:

- In 1993, the Commission encharged CEN with drawing up a comprehensive programme, including content and target dates, for the standardization activity required within the scope of Directive 97/23/EC.
- In response to the programme proposed by CEN, the Commission issued a mandate beginning in August 1994 under the code number M/071 comprising four individual standardization tasks for approximately 800 subjects (standards and parts of standards). The mandated standardization activity therefore effectively began at a time at which Directive 97/23/EC was still being debated. The required legislative basis for the standardization activity was not however put in place until the adoption of Directive 97/23/EC on 29 May 1997.

2.2 Structure of standardization activity at CEN level

2.2.1 Classification of standards

In accordance with the agreement reached between CEN and the Commis-

sion, harmonized standards within the scope of Directive 97/23/EC are drafted according to the following classification:

- Harmonized product standards, describing all aspects of a product (product type).
- Harmonized supporting standards, describing specific working or test methods.
- Harmonized supporting material standards, describing the parameters and characteristics of materials employed for pressure equipment.

In addition, provision is made within the non-harmonized scope for the drafting of supporting, basic and generic standards (for example governing terminology and concepts, welder examination, procedures for the testing of welds and other joints, nondestructive testing) for application on pressure equipment.

2.2.2 Technical committees involved

19 Technical Committees in CEN and 9 Technical Committees in ECISS (the European Committee for Iron and Steel Standardization) are involved in standardization activity within the scope of Directive 97/23/EC.

The technical committees in CEN (CEN/TCs) can be divided into three groups, according to the scope of the standards.

CEN/T	CEN/TCs for standards governing plant and plant components Secretario		
54	Unfired pressure vessels	BSI (UK)	
	Industrial valves	afnor (f)	
74	Flanges and their joints	DIN (DE)	
210	GRP tanks and vessels	DIN (DE)	
267	Industrial piping and pipelines	AFNOR (F)	
	Cryogenic vessels	afnor (f)	
269	Shell boilers and water-tube boilers	DIN (DE)	
286	Liquefied petroleum gas equipment and accessories	NSAI (EI)	

CEN/TCs for product standards	Secretariat
70 Manual means of fire fighting equipment	AFNOR (F)
182 Refrigerating systems, safety and environmental requirements	DIN (DE)
194 Utensils in contact with food	BSI (UK)

CEN	/TCs for basic standards	Secretariat
121	Welding	DS (DK)
132	Aluminium and aluminium alloys	AFNOR (F)
133	Copper and copper alloys	DIN (DE)
138	Non-destructive testing	AFNOR (F)
155	Plastic piping systems and ducting systems	NEN (NL)
185	Threaded and non-threaded mechanical fasteners and accessories	DIN (DE)
221	Shop fabricated metallic tanks	DIN (DE)
235	Gas pressure regulators	UNI (I)

The following ECISS technical committees are also involved in the drafting of basic standards for materials.

ECISS	ECISS/TCs for basic standards		
9	Technical conditions of delivery and quality control		
10	Structural steels – grades and qualities		
13	Flat products for cold working – qualities, dimensions, tolerances and specific tests		
15	Wire rod – qualities, dimensions, tolerances and specific tests		
22	Steels for pressure purposes - qualities		
23	Steels for heat treatment, alloy steels and free-cutting steels – qualities and		
	dimensions		
28	Steel forgings		
29	Steel tubes and fittings for steel tubes		
31	Steel castings		

2 Standardization structures within the scope of Directive 97/23/EC

2.2.3 Co-ordination of standardization activity

The standardization activity performed by technical committees pursuant to Directive 97/23/EC is co-ordinated by the Pressure Equipment Sector Forum within CEN. The council of the Sector Forum comprises:

- the Rapporteur, Mr L. Legin, as the expert representing industry. His particular function is to report to the Technical Board of CEN on the activities of the Pressure Equipment Sector Forum;
- the CEN Consultant, Mr. E. Crooks, CEN. His particular function is to assess, on behalf of the Commission, the candidates for harmonized standards with regard to their compliance with the terms of the mandate and the basic safety requirements of Directive 97/23/EC. This assessment essentially takes place in two stages: during the CEN enquiry, and prior to formal voting (see Fig. 3);
- the Project Manager, Mr S. Bezen. The Project Manager is the representative of the CEN Management Center (CMC).

In addition, a Pressure Equipment Advisory Nucleus Group has been established within CEN. This group comprises experts from industry, representatives of

European and national industry associations, the CEN Consultant, the Rapporteur of the Pressure Equipment Sector Forum, and the Project Manager. Its function is to advise the Rapporteur of the Pressure Equipment Sector Forum.

2.2.4 Status of European standardization of pressure equipment

Standardization within the scope of Directive 97/23/EC enjoys high status, in particular due to its immediate relevance owing to the imminent expiry of the transitional period on 29 May 2002, and to the economic significance of the pressure equipment sector for the Single Market. This significance can be seen, for example, from the fact that at present:

- approximately one-tenth of the CEN technical committees (10.4%), including the nine ECISS technical committees involved, are active within the scope of Directive 97/23/EC, and
- approximately one-tenth (9.7%) of the subjects addressed by CEN concern Directive 97/23/EC, either directly or indirectly.

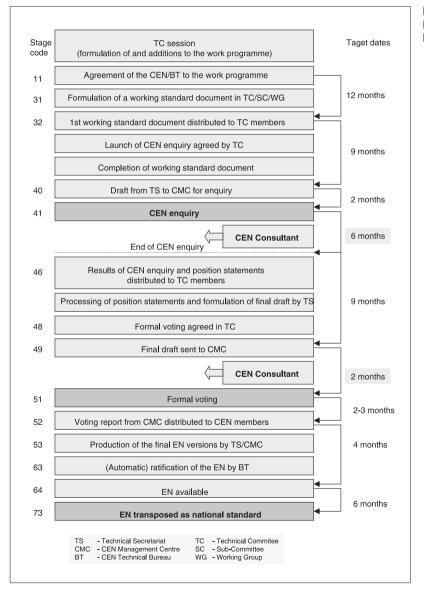


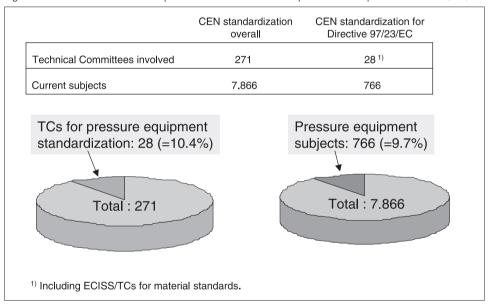
Fig. 3: Drafting of an EN

2 Standardization structures within the scope of Directive 97/23/EC

The actual figures (CEN data, correct June 2001) may be taken from the fol-

lowing summary and the diagrams in Fig. 4.

Fig. 4 Statistics on TCs and the subjects of standardization activity within the scope of Directive 97/23/EC



2.3 Structure of standardization activity at national level

The European standardization activity of the CEN technical committees addressing the scope of 97/23/EC is mirrored by the DIN working/mirror committees.

The umbrella standards committee for plant requiring surveillance (NÜA) was

created upon amendment of the agreement with DIN governing co-operation with the technical committees (published by the BMA on 18 December 1989, Federal Labour Gazette 2/1990, p. 133). The NÜA was dissolved on 31 December 1999, having fulfilled its original purpose. Since 1 January 2000, the work has been conducted in the competent standards committees named above.

DIN standards committee (NA)	Mirror CEN/TC
Standards Committee for Chemical Apparatus Engineering (FNCA) Contact: Mr Wolff	TC 54 Unfired pressure vessels¹)TC 210 GRP tanks and vessels
Standards Committee for Piping and Steam Boilers (NARD) Contact: Dr Hövel, Mr Hecker	 TC 74 Flanges and their joints TC 267 Industrial piping and pipelines TC 269 Shell and water-tube boilers
Standards Committee for Valves (NAA) Contact: Mr Wieczarek	- TC 69 Industrial valves
Standards Committee for High-Pressure Gas Installations (NDG) Contact: Mr Wilk	 TC 268 Cryogenic vessels TC 286 Liquefied petroleum gas equipment and accessories
Standards Committee for Refrigeration Engineering (FNKä) Contact: Ms Alke	- TC 182 Refrigerating systems, safety and environmental requirements
Standards Committee for Fire-Fighting (FNFW) Contact: Mr Behrens	- TC 70 Manual means of fire fighting equipment
Standards Committee for Materials Testing (NMP) Contact: Dr Hädrich	- TC 138 Non-destructive testing
Standards Committee for Iron, Steel and Metal Goods (HENBANE) Contact: Mr Junker	- TC 194 Utensils in contact with food
Standards Committee for Plastics (FNK) Contact: Mr Richter	- TC 155 Plastic piping system and ducting systems
Standards Committee for Tank Installations (NA Tank) Contact: Mr Ebeling	- TC 221 Shop-fabricated metallic tanks and equipment for storage tanks and for service stations
Standards Committee for Gas Installations (NA Gas) Contact: Mr Dupin (DVGW)	- TC 235 Gas pressure regulators

The mirror committee to CEN/TC 54 is the "Pressure Vessels" joint committee (GA 54), which operates under the auspices of the DIN Standards Committee for Chemical Apparatus Engineering (FNCA) and the "Requirements upon Characteristics - Standards DIN/CEN" sub-committee in the "Pressure Vessels" expert committee.

3.1 Hazard due to pressure and safety concept

In accordance with the hazard-oriented philosophy of the New Approach, Directive 97/23/EC covers the hazard due to pressure. The objective of the basic safety concept is to reduce the hazard due to pressure in accordance with the specified criterion of a high safety level. Some of the aspects of this safety concept which must also be considered from the perspective of standardization are presented below.

The hazard due to pressure is defined – in accordance with the general definition of "risk" – as follows:

hazard due to pressure = damage x probability of failure

In the context of Directive 97/23/EC, the damage is determined primarily by the potential hazard posed by the pressure equipment. An item of pressure equipment which contains a fluid under internal pressure represents a containment of energy and matter. The potential hazard posed by an item of pressure equipment can therefore be interpreted essentially as the resultant of the energy and matter components.

The potential hazard can be reduced by appropriate measures for the plant, process and installation concerned (for exam-

ple the use of processes involving low pressures and temperatures in controllable ranges, the use of non-critical substances and substances presenting lower hazard characteristics, reduction in the quantities of the substances); when the limits of these measures are reached, however, the potential hazard can no longer be influenced. These considerations are not, however, addressed by Directive 97/23/EC.

The **probability of failure** of an item of pressure equipment is a product of, in particular, the following factors:

- properties (construction and features), defined in particular by
 - the primary safety (integral safety) and the secondary safety (requisite protective equipment), described in terms of the basic safety requirements,
 - the requisite fulfilment of the basic safety requirements to be applied (conformity assessment);
- \square operation, defined in particular by
 - observance of the engineered safety requirements during erection and integration into the plant and process, including observance of the manufacturer's erection and commissioning instructions;
 - observance of proper operation,

including the manufacturer's instructions concerning unavoidable residual risks and risks arising from known or foreseeable improper use;

- proper maintenance (servicing, repair, inspection), in observance of the manufacturer's specifications and the state of the art;
- further organizational measures;
- regular inspections of the condition in accordance with national regulations.

Operation does not fall within the scope of Directive 97/23EC, with the exception of certain interfaces as defined above, such as the manufacturer's instruction handbook concerning erection, commissioning, use, maintenance and inspection by the user, and the manufacturer's instructions concerning residual risks and known or foreseeable improper use.

3.1.1 Assessment of the potential hazard

In order to ensure that the hazard due to pressure remains low, the probability of failure must be lowered progressively as the potential hazard rises. In accordance with the safety concept of Directive 97/

23/EC, these two factors are classified on the basis of comprehensible safety criteria, and brought into relation.

The system by which items of pressure equipment are assigned to categories is based upon comprehensive analysis of the potential hazard in consideration of both the energy and matter components.

The analysis of the potential hazard based upon the safety concept of Directive 97/23/EC will be presented in brief below. A distinction should be drawn here between two types of pressure equipment, pressure vessels and piping.¹

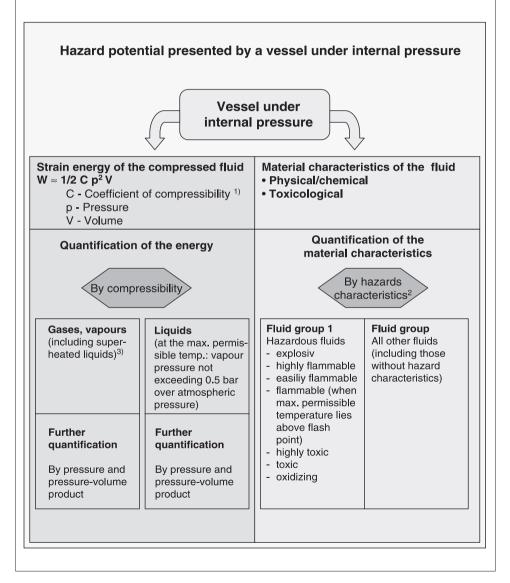
3.1.1.1 Pressure vessels

The analysis of the potential hazard for vessels can be illustrated as follows.

Directive 97/23/EC makes provision for classification of pressure vessels into Categories I-IV according to the analysis of the potential hazard. Diagrams 1-4 of Annex II are applied for this purpose.

Steam boilers and hot-water generators must be considered separately owing to specific aspects of the potential hazard. Diagram 5 of Annex II applies to more closely defined pressure vessels of this type.

 $^{^{1}}$ The scope of Directive 97/23/EC and selected concepts can be found in Annex 2.



3.1.1.2 Piping

The analysis of the potential hazard for pressure vessels is only of limited application to piping, in consideration of particular limit conditions:

- ☐ The spatial distribution of the strain energy is linear. It is relevant essentially only at higher nominal sizes and/or higher pressures. Only in this relevant case need a distinction be drawn between compressible and non-compressible fluids.
- ☐ The further quantification by pressure, nominal size and pressure-nominal size product is geared primarily not to the strain energy, but to the mass flow

rate released in the event of failure. According to the Bernoulli equation, the mass flow is determined i.a. by

- the driving pressure difference (= overpressure),
- the cross-sectional area of flow, considered by way of the nominal size, and
- the density of the fluid. A distinction must be drawn here between liquids on the one hand and gases/ vapours, with density ratios of up to three orders of magnitude, on the other. This differentiation between fluids according to the density criterion coincides closely with differentiation by the criterion of compressibility. These criteria have

$$C = -\frac{\Delta V}{V} \frac{1}{\Delta p}$$
 Unit: for gases, bar⁻¹; for liquids, ml · m⁻³·bar⁻¹

The coefficient of compressibility represents the relative change in volume (Δ V/V) brought about by a change in pressure equal to the unit ($\Delta p = 1$ bar). The compressibility is determined largely by the physical condition of the fluid. A distinction is drawn in the art between

- compressible fluids: gases, vapours; and
- incompressible fluids (strictly speaking, fluids of low compressibility): liquids.

The coefficients of compressibility of compressible fluids are higher than those of incompressible fluids by two to four orders of magnitude, depending upon the type of material and the pressure and temperature conditions. The strain energy values of the compressible fluids are therefore higher by two to four orders of magnitude than those of the incompressible fluids under given pressure and volume conditions.

- ² Hazard characteristics in accordance with Directive 94/69/EC, transposed by the German Ordinance on Hazardous Substances.
- The classification of super-heated liquids to the compressible fluids is not logical in physical terms, but is required for reasons of safety. Owing to the delay in boiling, a risk exists of sudden re-evaporation as the pressure drops. High strain energy levels may then arise in the compressible vapour phase.

¹ The coefficient of compressibility is an indicator of the compressibility of a fluid, and is generally defined in the art as

3 Directive 97/23/EC from the perspective of standardization

to some degree mutually opposing effects upon the analysis of the potential hazard on piping, however.

Based upon the above analysis of the potential hazard, Directive 97/23/EC makes provision for classification of pip-

ing into Categories I – III. Diagrams 6 – 9 of Annex II are applied for this purpose.

The diagram assignment in accordance with Annex II is shown in the diagram below, and reflects the classification according to the potential hazard.

Fluid properties		Diagram Vessel	in Annex II Piping
Compressible fluids: gases, vapours and super-heated liquids	Group 1 Group 2	Diagram 1 Diagram 2	Diagram 6 Diagram 7
Incompressible fluids: liquids (not super-heated)	Group 1 Group 1	Diagram 3 Diagram 4	Diagram 8 Diagram 9
Exception: fired or otherwise heated pressure with a risk of overheating for generation of s or super-heated water (T $>$ 110 °C)		Diagram 5	

Note 1.

Pressure equipment with a risk of overheating intended for generation of steam or super-heated water at temperatures higher than 110 °C is classified separately in accordance with Diagram 5 of Annex II owing to the particular aspects of the potential hazard.

Note 2:

Directive 97/23/EC also covers pressure equipment of the type "pressure accessories". The following classification system applies to pressure accessories:

- Pressure accessories are classified as
 - vessels, when their volume
 - piping, when their nominal size

is to be considered the significant geometrical quantity. Where both volume and nominal size are to be considered significant, the pressure accessory is to be assigned to the higher of the two categories.

Safety accessories are automatically assigned to Category IV. Exception: safety accessories manufactured for specific pressure equipment may be assigned to the same category as the pressure equipment which they protect.

3.1.2 Analysis of the probability of failure

Classification into Categories I-IV by increasing potential hazard corresponds to a graded reduction in the probability of failure.

Within the range of product characteristics falling within the scope of Directive 97/23/EC, the graded reduction in the probability of failure is achieved by classification of

- certain essential safety requirements in accordance with Annex I, and
- the conformity assessment procedure in accordance with Annex III.

3.1.2.1 Classification of specific requirements

Application of the basic safety requirements set forth in Annex I is mandatory for

- pressure equipment the design parameters of which exceed the limits of the potential hazard indicated in Article 3 (1). This concerns pressure equipment classified in accordance with the diagrams of Annex II in Categories I-IV, together with certain special cases;
- assemblies containing at least one item of pressure equipment in accord-

ance with Article 3 (1) (including the special case of assemblies intended for generating steam or super-heated water at temperatures not greater than $110\,^{\circ}\text{C}$ which are manually fed with solid fuels and which possess a pressure-volume product $> 50\,$ bar litres).

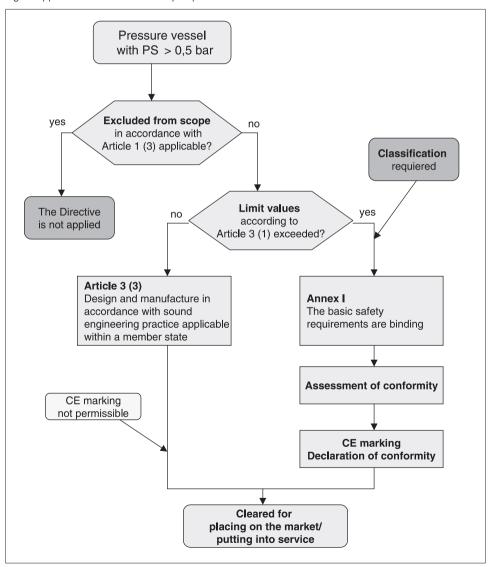
The provisions of Article 3 result in the following peculiarity: Annex I is not binding upon items of pressure equipment subject to the scope of Directive 97/23/EC but which do not exceed the limits of the potential hazard as specified in Article 3 (1). In accordance with Article 3 (3), sound engineering practice applicable in a member state is to be applied for such pressure equipment. This also means that (see Fig. 5)

- the conformity assessment procedures described in Annex III of Directive 97/ 23/EC are not applicable, and
- the CE mark may not be affixed to such pressure equipment.

The provisions of Article 3 (3) apply accordingly to assemblies for which the basic safety requirements of Annex I are not binding.

The basic safety requirements of Annex I governing design, manufacture and materials may be presented in simplified form as follows:

Fig. 5 Application of the basic safety requirements of Annex I



Generally applicable requirements.
 Provision is made here for classification of certain requirements in accord-

ance with the potential hazard/by categories (refer to the example list below).

Classification of certain basic safety requirements (list of examples)		
Experimental design (alternative to calculation method)	Permissible for: $PS \times V < 6,000 \text{ bar} \times \text{litres}$ $PS \times DN < 3,000 \text{ bar}$	
Method and personnel for permanent joints (joining processes)	Certification by notified body or recognized third-party organization required for Categories II, III, IV	
Personnel for non-destructive testing	Certification by recognized third-party organization required for Categories III, IV	
Particular material appraisal	Production by notified body required for Categories III, IV	
Demonstration of the material quality	Certification with specific testing required for Categories II, III, IV	

- Further specific requirements for the following types of pressure equipment:
 - fired or otherwise heated pressure equipment with a risk of overheating, in particular aspects relating to design and equipment, and
 - piping, in particular concerning aspects of design and flow.
- Particular quantitative requirements for certain items of pressure equipment. With their high level of detail and specification of actual parameters, the above requirements set forth

in Annex I Section 7 are atypical of the technical annex of a directive in accordance with the New Approach. These requirements are generally applicable in accordance with the included saving clause. Should they not be applied, the manufacturer must demonstrate an equivalent overall level of safety.

3.1.2.2 Classification of the conformity assessment procedures

The detailing of options for the treatment of pressure equipment in accordance with the modular system of the Global Approach (Decision 93/465/EEC) has given rise to a complex system of modules and module combinations for the conformity assessment of pressure equipment and assemblies. This system is set forth in Annex III of Directive 97/23/EC (see Fig. 6).

The system of conformity assessment procedures referred to above is based upon the following principles:

- The design and manufacturing phases of product development are covered in a consistent fashion.
- With the exception of Module A, "Internal production control", which describes testing performed by the manufacturer, the procedure makes provision for the involvement of a third party (notified body and operator's test body with competencies for modules A1, C1, F and G).
- From Category II upwards, a number of options are available to the manufacturer. Product-oriented and systemoriented examination are presented as equal alternatives.
- The manufacturer is at liberty to select a conformity assessment procedure which is intended for a higher category (where such a category exists).

In accordance with the safety concept of Directive 97/23/EC, the conformity as-

sessment procedures are classified in ascending order, and assigned to the categories.

Cate- gory	Conformity assessment procedure modules ¹ (alternatives)				
I	А				
II	A1	D1	E1		
III	B1+D	B1+F	B+E	B+C1	Н
IV	B+D	B+F	G	H1	

The manufacturer may also apply a conformity assessment procedure applicable to a higher category, where such a category exists.

3.2 Resulting provisions for standardization

3.2.1 Technical requirements

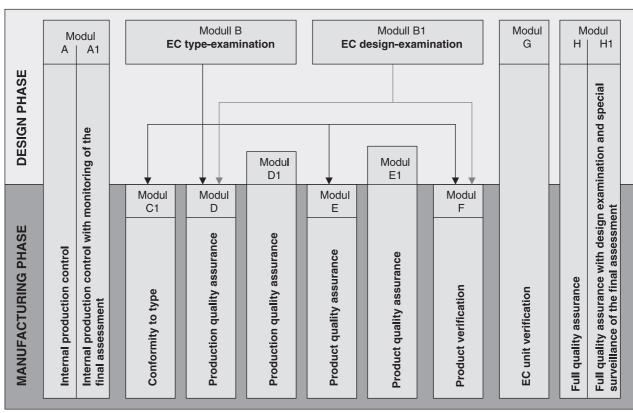
In the European Commission's mandate, CEN was encharged with specifying, by means of standards, the basic safety requirements for certain product families (29 in total) in accordance with Annex I of Directive 97/23/EC. The standards to be drafted must comply with the basic safety requirements of Annex I and provide added technical value in the form of technical specifications.

3.2.1.1 Generally formulated requirements

The specifications for standards set forth in Annex I of Directive 97/23/EC

Fig. 6: Modules and module combinations of the conformity assessment procedures

Conformity assessment procedures in accordance with Annex III of Directive 97/23/EC (Council Decision 93/465/EEC of 22 July 1993)



- in the Sections entitled
 - 1 General
 - 2 Design
 - 3 Manufacture
 - 4 Materials
- and for specific items of pressure equipment in Sections entitled
 - 5 Fired or otherwise heated pressure equipment with a risk of overheatina
 - 6 Piping

are formulated with satisfactory precision with regard to the objectives of protection, but nevertheless in general terms. Adequate scope for detailing by technical specifications is therefore created for standards.

Standardization is subject to the general requirement that the safety concept embodied in Directive 97/23/EC be implemented consistently during the drafting of technical specifications with regard to the classification system of the potential hazard and the probability of failure. (The detailing, shown in Chapter 7.3.2 of the present report, of specific provisions of Annex I represents a specific example of such an implementation.)

3.2.1.2 Particular quantitative requirements

Section 7 of Annex I of Directive 97/23/ EC sets forth particular avantitative reguirements for certain items of pressure equipment. Despite the saving clause, in accordance with which they are generally to be applied, these quantitative requirements define a standard for the overall level of safety which is to be attained.

This results in a defined requirement for the standardization process to incorporate these quantitative requirements into the technical specifications where applicable. Should these requirements not be relevant or technically applicable, standards must specify alternative suitable methods by which an equivalent overall level of safety can be assured

A number of selected examples of quantitative requirements are given below with regard to the consequences for standardization

a) The permissible general membrane stress (design stress) for predominantly static loading below the range in which creep is significant for the strength parameters.

For certain materials, the permissible design stress values are specified in terms of the yield strength or proof strength, and also of the tensile strength. The lower value of the two values is the design stress value.

For ease of comparison, the safety coefficients obtained by back-calculation

from the permissible values for the design stress are indicated below.

Material	Safety coefficient for calculation of the design stress	
	Yield/proof strength ¹	Tensile strength
Ferritic steel (exception: fine-grain steel, steel with special heat treatment)	1,5	2,42)
Austenitic steel - Elongation at rupture > 30% alternatively	1,5	
- Elongation at rupture > 35%	1,2	3,03)
Unalloyed or low-alloyed steel casting	1,9	3,02)
Aluminium	1,5	
Non-age-hardenable aluminium alloys	1,5	2,42)

The yield/proof strength is a function of the design temperature and signifies:

Specification of the permissible values for the design stress for certain material groups may in some cases place constraints upon standardization, for example:

 In accordance with proven German regulations, e.g. the AD pressure vessel code of practice, the design stresses for ductile materials are generally specified as a function of the yield strength/proof strength as the significant strength parameter (and only for specific materials, e.g. grey cast iron, as a function of the tensile strength). The requirement that the permissible design stress be determined as the lower of two values derived from the yield strength/proof strength and the tensile strength may lead to uneconomical dimensioning without a measurable enhancement in safety, for example in the case of ferritic steels with yield strengths in the order

⁻ the upper yield strength of materials with a pronounced yield strength,

⁻ the 1.0% proof strength of austenitic steel and unalloyed aluminium,

⁻ the 0.2% proof strength in all other cases.

 $^{^{2}}$ In relation to room temperature RT = 20 $^{\circ}$ C.

³ In relation to the design temperature.

- of 350 N/mm² upwards. In such special cases, standards must specify alternative solutions.
- For materials other than those listed. for example non-ferrous metals and non-metallic materials, standards must specify additional or alternative criteria for limitation of the permissible loading of the material. An equivalent safety margin with respect to the strength parameters of the material concerned must however be assured. This may be difficult to achieve under certain circumstances. For GRP pressure equipment, exploitation of the material strength is limited not by stress values, but by the permissible expansion of the laminate (max. 0.25%). Special partial safety coefficients, for example for consideration of the reduction in strength of the laminate over time as a result of chemical influences and ageing, must assure a residual safety corresponding to the safety coefficient of 1.5 at the end of the intended life of the equipment. This requirement presumes a comprehensive standardization concept, including, in particular cases, prospective short-term and long-term tests to be performed by the manufacturer, in order for the reauired equivalent overall level of safety to be documented comprehensibly.

b) The joint coefficients for welded joints ("weld factor"). Exploitation of the permissible design stress in welded joints must not exceed the following values. which are determined by the joint coefficients:

Joint coefficient	Required testing
1,0	Destructive and non- destructive testing
0,85	Spot non-destructive testing
0,7	Visual inspection (no non-destructive testing)

As applied within proven bodies of regulations, e.g. the AD pressure vessel code of practice and TRD technical rules for steam boilers, the overall safety concept encompasses the destructive and/or nondestructive tests provided for in the manufacturing phase, for purposes such as continuous surveillance of the quality of welded joints. Accordingly, no provision is made in these regulations for low joint coefficients.

The joint coefficient of 0.7 in conjunction with the absence of destructive and nondestructive testing is geared towards compensating for the uncertainty of undetected impermissible welding errors by overdimensioning of the pressure envelope.

The consequence for standardization is that suitable supplementary measures may have to be specified in order for the objective of an equivalent overall level of safety to be attained; it may have to be assumed that the objective may be attainable only by further restriction of the scope of application, on the basis of a case-by-case analysis of the potential hazard.

c) Hydrostatic test pressure.

The test pressure to be generated during the pressure test must correspond to the greater of the following two values:

- 1.25 times the maximum loading to which the pressure equipment may be subjected in service, taking into account its maximum allowable pressure and its maximum allowable temperature,
- 1.43 times the maximum allowable pressure.

This results i.a. in the following specifications for standardization.

Regarding the test pressure factor of 1.25:

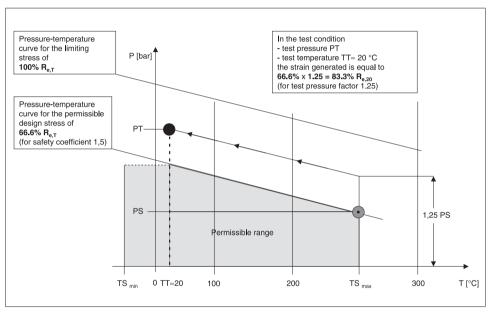
 Specification of the test pressure must take into account further loading resulting for example from increased differential pressure on vacuum enve-

- lopes, the weight of the liquid column, with application where applicable of the correction factors for consideration of the density differences between the operating and test media.
- Consideration must be given in the pressure test concept to the drop in strenath characteristics commensurate with rising temperature. Where the test temperature TT (generally room temperature, TT=RT) lies below the maximum allowable temperature TSmax (design temperature), the test pressure must be corrected by the ratio of the strength parameters at TT and TSmax. The objective is to create a loading upon the material increased by the test pressure factor of 1.25 with respect to the design condition, but in terms of the strength parameter at the test temperature.

The diagram in Fig. 7 shows the relevant temperature characteristic curves of the pressures; the permissible design stress is related by way of example to the yield strength as the strength parameter.

Standards must specify this concept by indicating the formulae for the test pressure, giving consideration in particular to the temperature correction factor and where applicable the corrosion allowance correction factor, and the requisite limit conditions.

Fig. 7 Temperature characteristic curves – Design pressure/test pressure



Concerning the test pressure factor 1.43:

The test pressure factor 1.43, in terms for example of the yield strength, means that in the test condition, a stress level of 95% of the yield strength is achieved, corresponding to a residual safety coefficient of approximately 1.05.

In certain cases, for example where particular design regulations are applied or special materials or designs selected, it may not be possible to apply this test pressure factor. This has the consequence for standardization that in these cases, suitable supplementary measures must be specified for demonstration of adequate strength within the context of an equivalent overall level of safety.

d) Material characteristics

In the absence of other relevant criteria, the following minimum parameters are specified for the ductility and toughness of steels: Elongation at rupture in tensile test

14 %

Notch impact energy 27 J (ISO V sample at a temperature of max. 20 °C and not higher than the lowest operating temperature)

In consequence, where materials are employed which do not meet the specified criteria for ductility and toughness, standards must specify other suitable methods for the avoidance of brittle fracture.

3.2.2 Test requirements

Owing to the complexity of the system of modules/module combinations in the conformity assessment, it would be to the user's advantage if standards were to provide an explanation of this procedure, particularly with regard to the involvement of third parties (neutral test bodies).

A very general overview is provided below of the functions and responsibilities of the recognized third-party organizations (neutral test bodies) in accordance with Directive 97/23/EC.

In the area of neutral testing and final assessment, it is particularly important

that the tasks of the manufacturer and the third-party organizations be presented and explained (who tests what and when) in standards in the form of detailed work and test procedures, with specific reference to the conformity assessment procedure to be employed. Such approaches have been integrated into some parts of standards in the form of informative annexes, for example.

- prEN 12952-6 Water-tube boilers and auxiliary installations – Part 6: Inspection during construction, documentation and marking of pressure parts of the boiler
- prEN 12953-5 Shell boilers Part 5: Inspection during construction, documentation and marking of pressure parts of the boiler
- prEN 13445-5 Unfired pressure vessels Part 5: Inspection and testing
- prEN 13480-5 Metallic industrial piping – Part 5: Inspection and testing

During assessment of the final drafts of the most advanced standards projects (EN 12952 and EN 12953 series of standards), the CEN Consultant objected in his report to the inclusion of any such annexes, even of an informative nature, in harmonized standards. This resulted in formal voting on the above series of standards, and consequently their ratification, being delayed.

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Tasks and competencies	in accordan	Third parties ace with Directive 9	7/23/EC
	Notified body	Recognized third- party organization	User inspectorate
	(Article 12)	(Article 13)	(Article 14)
Conformity assessment - Product-oriented testing - Certification and monitoring of	⊠ ¹)		$oximes^{2)}$
quality assurance systems			
Particular material appraisal (for pressure equipment in Categories III, IV)	X		⊠ ³⁾
European approval for materials (in accordance with Article 11)	X ⁴⁾		
Certification of Personnel Working methods for permanent joints (for pressure equipment in Categories II, III, IV)	X	X	図5)
Certification of personnel for non- destructive testing (for pressure equipment in categories III, IV)		X	

All modules/module combinations with the exception of Module A ("Internal production control" = manufacturer's testing).

- 3) Only within the context of Module G ("EC unit verification").
- 4) Only notified bodies accredited specially for the purpose.
- 5) Only certification of working methods.

²⁾ Modules A1, C1, F, G (product testing) only. User inspectorates work solely for the group of companies to which they belong. CE marking may not be applied to pressure equipment and assemblies conformity assessment of which has been performed by a user inspectorate; these may only be used in plants within the group of companies to which the user inspectorate belongs.

The European Commission clarified this issue to CEN in its communication dated 21 March 2001, ref.: ENTR/G4/CW/fh/D(2001) 845091. It stated its position essentially as follows:

The conformity assessment procedures are derived formally from the Global Concept (Council Decision 93/465/ EEC) and are specified in Annex III of Directive 97/23/EC. Owing to their statutory nature with regard to the presumption of conformity, interpretations reaarding the conformity assessment procedure and the involvement of neutral test bodies are not permissible in harmonized standards, even in the form of informative annexes. CEN is required to delete such annexes from candidates for harmonized standards. CEN remains at liberty, however, to provide users with such interpretations and explanations outside the harmonized standards, for example in explanatory documents.

The consequence for CEN is that the informative annexes referred to above had to be deleted from the draft standards concerned and transferred, as non-harmonized parts of the standards in question, to documents with, for example, the status of a CEN Report. CEN/TCs 54, 267, 269 and 286 are particularly affected by such revision.

3.2.3 Guidelines relating to Directive 97/23/EC

Guidelines are drafted for the clarification of certain issues and procedures relating to Directive 97/23/EC. The statutory status of the guidelines is described by the Commission as follows:

The guidelines contain a series of documents, arranged by subject. They reflect the view of the Working Group Pressure of the experts of the member states in the administration of the Commission. and address auestions posed to the working group by the member states. In order to provide the required clarification of certain issues, orientation documents are drawn up over a certain period of time dealing with questions of general interpretation and technical questions. Technical questions are debated beforehand in the forum for the notified bodies, and presented to the group of experts of the member states for approval.

The guidelines have an informal status and are not binding. Although they contain information on issues relating to the directive, their purpose is one of orientation only, and they are intended to facilitate compliance with the obligations of the directive, irrespective of whether these apply to manufacturers, notified bodies or other interested parties. The

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obligations embodied in the directive may be met in other ways.

As the guidelines (102 in total as of 26 June 2001) represent a consensus between the experts of the member states and will probably become of major de

facto importance, they must also be taken into account by standards. Annex 3 provides an overview of the subjects addressed by the guidelines. Certain selected guidelines with a direct bearing upon standards or harmonized standards are shown by way of example.

4 Conducting of the enquiry

4.1 Terms of reference

In accordance with the project description and the explanatory provisions presented by the working group supporting the project at its session held on 29 June 2001, the terms of reference comprised

- ascertainment of the present status of standardization;
- assessment of conformity with the "German Consensus Statement";
- assessment of transposition of the German regulations into European standards;
- identification of the existing need for standardization in contrast to the current standardization programme, as ascertained by German experts.

4.2 Sources of information

The analysis of standardization in the area of pressure equipment is based upon the following sources:

- standards, draft standards, working documents, documents issued by the CEN and ECISS standards committees involved and by the CEN Technical Board (CEN/BT), reports by the CEN Consultant, European Commission documents;
- Internet research (web pages of the European Commission and CEN);

- consultation of DIN Secretaries on the current status of standardization activity in the area of pressure equipment;
- consultation by questionnaire of the DIN Secretaries and experts (manufacturers and manufacturers' associations, technical inspection organizations and notified bodies, operators' testing bodies, accident insurance institutions, operators, public authorities);
- interviews, on special subjects, with selected experts playing a significant role in standardization activity.

4.3 Procedure

4.3.1 Ascertainment of the current status of standardization activity

The following procedure was selected for ascertainment of the current status of standardization activity, i.e. standards projects in progress and standards already ratified which fall within the scope of Directive 97/23/EC:

In a preliminary phase, the directories of the registered standards projects within the scope of Directive 97/23/EC for the selected CEN/TCs were queried, from the CEN project database by way of an Internet search, and from the DIN project database by consultation of the responsible DIN Secretaries.

4 Conducting of the enquiry

Following a comparative survey of the CEN and DIN directories, updated directories were produced for the purpose of the project. The DIN Secretaries were consulted again regarding changes which in some cases had not yet been reflected in the databases.

4.3.2 Consultation of interested groups

The following procedure was followed for the consultation of interested groups.

a) Consultation by questionnaire

Involved and interested parties were consulted in this operation. The objective was to achieve a balanced representation under the given circumstances. A distinction was drawn between two categories of consulted party:

- experts who were to be consulted on the standardization activity as a whole;
- experts who were to provide specific comment or assessment of particular areas or standards/series of standards.

As the group standards for vessels, piping and steam boilers are not yet available and users (in particular manufacturers, operators/purchasers, third parties, inspection bodies, accident insurance institutions) have therefore not yet been

able to gain proven experience with their application, the groups consulted had to be restricted to the experts involved directly in the standardization activity, in particular those on the CEN committees. This led in some cases also to restriction of the groups represented in the questionnaire, as not all groups delegated standards experts to the CEN committees, or were able to maintain unbroken involvement in standardization activity over time.

b) Interviews, with selected experts with significant involvement in standardization activity on specific technical subjects, arising in some cases during evaluation of the results of the questionnaires and regarded as relevant in the evaluation of certain aspects of the standardization activity.

4.4 Overview of the groups consulted

The following groups were consulted by means of questionnaires:

DIN Deutsches Institut f
 ür Normung e.V.

Standards Committee for Chemical Apparatus Engineering, (FNCA)

Standards Committee for Piping and Steam Boilers (NARD)

Standards Committee for Valves (NAA)

Standards Committee for High-Pressure Gas Installations (NDG)

Standards Committee for Refrigeration Engineering (FNKä)

Manufacturers

APOLDAer Feuerlöschtechnik GmbH, Apolda

Linde AG, process engineering and plant construction division, Höllriegel-skreuth

Messer Griesheim GmbH, Krefeld

Operators

Bayer AG, Leverkusen
BASF AG, Ludwigshafen
Messer Griesheim GmbH, Krefeld
Linde Gas AG, Höllriegelskreuth

 Accident insurance institutions, committees of experts of the HVBG (German Federation of Institutions for Accident Insurance and Prevention)

Institution for statutory accident insurance and prevention in the chemical industry, Heidelberg

"Chemicals" expert committee, Heidelberg

Institution for statutory accident insurance and prevention in the civil engineering sector, Munich

Industry associations

DVGW (Deutscher Verband des Gasund Wasserfaches), Bonn

DVFG (Deutscher Verband Flüssiggas e.V.), Kronberg

FDBR (Fachverband Dampfkessel-, Behälter- und Rohrleitungsbau e.V.), Düsseldorf

IGV (Industriegaseverband), Köln

Industrieverband Stahlverarbeitung, Siegen

MWV (Mineralöl-Wirtschaftsverband), Hamburg

VCI (Verband der chemischen Industrie), Frankfurt am Main

VDMA (Verband Deutscher Maschinen- und Anlagenbau), Frankfurt am Main

Verein deutscher Eisenhüttenleute, Düsseldorf

ZVSHK(Zentralverband Sanitär, Heizung, Klima), St. Augustin

ZVH (Zentralverband Haustechnik e.V.), Hagen

4 Conducting of the enquiry

Public bodies

Federal Ministry for Labour and Social Affairs (BMA)

Federal Institute for Occupational Safety and Health (BAuA), Dortmund

Ministry of the Environment and Transport of the State of Baden-Württemberg, Stuttgart

 Test bodies, technical inspection organizations

Bayer AG, Technische Überwachung, Leverkusen

Rheinisch-Westfälischer TÜV, Essen

Technische Anlagenüberwachung, BASF AG

TÜV Bau und Betrieb, München

4.5 Catalogue of questions

For reasons of practicability, two questionnaires with linked content were drawn up for consultation of the groups involved. The catalogue of questions below represents a combination of the questions on both questionnaires:

 Was the "German Consensus Statement" observed during standardization activity?
 If not, provide specific examples and reasons.

- 2. Has the technical content of the German regulations governing pressure equipment (TRB technical rules for pressure equipment pressure vessels, AD pressure vessel code of practice, BG regulations, DIN standards and other technical regulations identified according to the state of the art) been incorporated into the standards currently being drawn up, in particular the EN 13445 series of standards, "Unfired pressure vessels"?
 - a) Yes
 - a1) Sufficiently for preservation of the existing national safety level
 - a2) Only in part; safety deficits may
 - b) No

Where the answer is a2) or b), provide examples and reasons.

- 3. Has the technical content of the German regulations governing piping (TRR technical rules for pressure equipment piping, AD pressure vessel code of practice (where applied), BG regulations, DIN standards and other technical regulations identified according to the state of the art) been incorporated into the EN 13480 series of standards "Metallic industrial piping" currently being drawn up?
 - a) Yes

- a1) Sufficiently for preservation of the existing national safety level
- a2) Only in part; safety deficits may arise
- b) No

Where the answer is a2) or b), provide examples and reasons.

- 4. Has the technical content of the German regulations governing steam boilers (technical rules for steam boilers, BG regulations, DIN standards and other technical regulations identified according to the state of the art) been incorporated into the EN 12952 and EN 12953 series of standards, "Water-tube boilers and auxiliary installations" and "Shell boilers" respectively, which are currently being drawn up?
 - a) Yes
 - a1) Sufficiently for preservation of the existing national safety level
 - a2) Only in part; safety deficits may arise
 - b) No

Where the answer is a2) or b), provide examples and reasons.

5. Does a need for standardization exist beyond the current standards projects?

- a) Yes
- a1) regarding existing standards concerning
- revision and/or
- extension of the scope
- a2) regarding the drafting of new standards
- b) No

If so, please state specific proposals.

The above catalogue does not contain the questions for

- consultation of the DIN Secretaries regarding the current status of standards projects and the latest developments at CEN, in particular in CEN/ TC 54, 267 and 269, and
- interviews on special subjects with selected experts with significant involvement in standardization activity.

4.6 Replies received

A summary is provided on page 52 of the replies which were received and which could be exploited:

4 Conducting of the enquiry

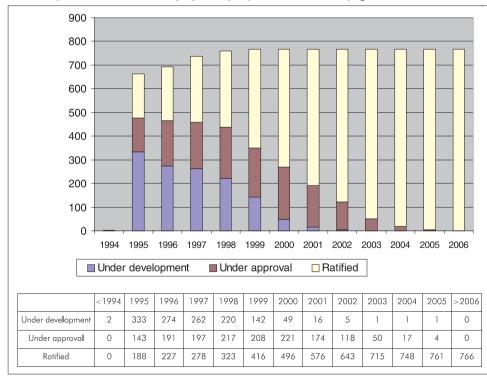
Question	Replies received	Of which exploitable
1	27	26
2	13	12
3	13	12
4	7	6
5	27	25

5.1 Scope of the analysis

Mandate M/071 under Directive 97/23/ EC made provision for the drafting of

- approximately 100 standards governing plant and plant components (in particular pressure vessels, piping, steam boilers, GRP tanks and vessels, liquefied petroleum gas equipment,
- cryogenic vessels, valves, flanges and their joints),
- approximately 130 product standards (in particular governing refrigerating systems, portable fire extinguishers, steam pressure cookers),
- approximately 570 supporting standards (in particular governing materials), including basic and generic

Fig. 8: Figures on the progress of the work in CEN for the Directive 97/23/EC (covered: 766 mandated project subjects). Source: CEN Web pages.



standards (in particular governing joining processes/welding, nondestructive testing, and test procedures),

as candidates for harmonized standards and harmonized supporting standards, and as supporting standards (which cannot be harmonized, as they do not specify any basic safety requirements set forth in Directive 97/23/EC). An overview of the present status of standards projects in progress is provided by the statistical summary in Fig. 8 (source: CEN web pages). 28 CEN and ECISS technical committees are currently involved in this standardization activity.

Owing to the broad range of standardization activity within the scope of Directive 97/23/EC, the analysis in the context of the project had to be restricted to the key technical areas. In particular, the areas of standardization activity were to be covered which primarily concerned the drafting of candidate harmonized and harmonized supporting standards, with the exception of harmonized supporting material standards.

In accordance with the above criteria, all CEN/TCs involved in the standardization of plant and plant components were selected for the analysis.

CEN/TC 54 Unfired pressure vessels

_	CEN/TC 69	Industrial valves
_	CEN/TC 74	Flanges and their
		joints
_	CEN/TC 210	GRP tanks and vessels
_	CEN/TC 267	Industrial piping and
		pipelines
_	CEN/TC 268	Cryogenic vessels
_	CEN/TC 269	Shell and water tube
		boilers
_	CEN/TC 286	Liquefied petroleum
		gas equipment and
		accessories

and one product standardization CEN/ TC of particular relevance to occupational health and safety:

CEN/TC 182 Refrigerating systems, safety and environmental requirements

5.2 Results of the analysis

The following developments in CEN/TCs 54, 267 and 269 in particular necessitated updating of the directories of standards projects:

Owing to the comment by the CEN Consultant rejecting certain final drafts of the EN 12952 and EN 12953 series of standards, "Watertube boilers and auxiliary components" and "Shell boilers" respectively, formal voting on these standards was delayed. The rejection was justified on

the grounds that the informative annexes contained interpretations of the conformity assessment procedures and the involvement of neutral test bodies. The European Commission was requested to clarify these more general issues. The statement by the European Commission required the informative annexes to be removed from the candidates for harmonized standards. The following procedure has been adopted at CEN level for ease of application of the standards: the interpretations of the conformity assessment procedures and the involvement of neutral test bodies are to be compiled in CEN Reports (CRs) with the status of explanatory documents not capable of harmonization. In order to ensure ease of classification, these CEN Reports are to be managed as independent parts within the series of standards. This results in changes to the structure of the series of standards

- EN 12952 Water-tube boilers and auxiliary installations
- EN 12953 Shell boilers
- EN 13445 Unfired pressure vessels
- EN 13480 Metallic industrial piping.

A new subject, that of guidelines for the involvement of a third-party inspection

body, will be added to each of the above series of standards in the near future.

□ During debate of the objections following the CEN enquiry for the EN 13445 "Unfired pressure vessels" (CEN/TC 54) and EN 13480 "Metallic industrial piping" (CEN/TC 267) series of standards, amendments to the structure of the series of standards, including the following, were initiated at short notice.

The standard parts (drafts) created by a joint working group comprising CEN/TCs 54 and 267, namely

prEN 13445-6 Unfired pressure vessels – Part 6 : Safety systems

prEN 13480-6 Metallic industrial piping — Part 6: Safety systems

were removed from their respective series of standards and combined in a new part of the general series of standards prEN 764-7 Pressure equipment – Part 7: Safety systems for unfired pressure equipment. This generic standard is intended as a candidate for a harmonized supporting standard.

A need for the directories of the standards projects to be updated also arose for other CEN/TCs, as a result of regular

revision of the latter's business plans and adaptation to the interim changes in the terms of reference of standardization work in certain areas.

The updated directories of the standards projects created as a result of the analysis are shown in Annex 4.

For the sake of completeness, the directory of harmonized standards for pressure equipment, the references of which have been published in the Official Journal of the European Communities, is shown in Annex 5.

5.3 Future activities

In the view of the European Commission, successful implementation of Directive 97/23/EC is dependent i.a. upon the availability of harmonized standards at

expiry of the transitional period and the beginning of unrestricted application of the directive on 29 May 2002.

Accordingly, the Commission's strategic objective is for the basic series of harmonized standards to be completed by 29 May 2002 at the latest, in order for their references to be published in the Official Journal of the European Communities on this date. Owing to the proximity of expiry of the transitional period and the backlog of work in some TCs, this objective leads to increased pressure upon CEN and the TCs concerned to intensify their efforts.

The current status and the assessment regarding attainment of the objective are summarized below for the basic series of standards.

Current situation and future activity	Deadline 29 May 2002
CEN/TC 54 EN 13445 Unfired pressure vessels, Parts 1–7 The objections resulting from the CEN enquiry have largely been dealt with the final drafts of the parts 1 General 2 Materials 4 Manufacture 6 Supplementary requirements concerning the design and manufacture of pressure vessels and pressure vessel components from spheroidal graphite iron castings are either complete or can be completed shortly for formal voting. A need for action currently exists regarding points to be clarified in the parts 3 Design, 5 Inspection and testing. The CEN Report designated Part 7 is awaiting completion as an explanatory document.	jeopardized¹
CEN/TC 54 EN 764 Pressure equipment, Parts 1–7 The parts 1 Terminology - pressure, temperature, volume, nominal size 6 Instruction handbook are currently at the CEN enquiry stage. The parts 2 Terminology - quantities, symbols and units 3 Terminology - definition of parties involved 4 Establishment of technical delivery conditions for materials 5 Inspection certificates for metallic materials and compliance with the material specification 7 Safety systems for unfired pressure equipment are ready for formal voting.	Attainable for Parts 5 and 7, which are intend- ed as candidates for harmonized supporting stand- ards.

Attainment of the objective is to be regarded as jeopardized in the case of the EN 13445 "Unfired pressure vessels" series of standards. The Commission identified an urgent need for action in this case, and convened a BT high level group meeting on 29 June 2001, at which representatives from the Commission, the highest levels of CEN, and national standardization organizations DIN, AFNOR and BSI were present, together with responsible officials in the secretariats of CEN/TC 54 and its working groups. As a result of this meeting, new schedules the detail of which extended to specific dates and personal responsibilities were drawn up for the EN 13445 series of standards. Owing to differences in the stages of processing of candidates for harmonized standards, the new schedules for Parts 1, 2, 4 and 6 differ from those for Parts 3 and 5. A pragmatic approach involving accelerated procedures is intended to ensure that the deadline for the complete series of standard is to be met. A higher-level monitoring group was set up to monitor the progress of activity according to the new schedules, and to provide regular reports.

5 Ascertainment of the current status of standardization activity

Current situation and future activity	Deadline 29 May 2002
CEN/TC 267 EN 13480 Metallic industrial piping, Parts 1-7	Attainable
The objections arising from the CEN enquiry are being dealt with to schedule.	
The final drafts are expected to be complete in time for formal voting in March 2002 as planned. The CEN report designated as Part 7 is awaiting completion as an explanatory document.	
CEN/TC 269 EN 12952 Water-tube boilers and auxiliary installations, Parts 1-17	Attainable
Formal voting has largely commenced. The CEN report designated as Part 17 is awaiting completion as an explanatory document.	
CEN/TC 269 EN 12953 Shell boilers, Parts 1-14	Attainable
Formal voting has largely commenced. The CEN report designated as Part 14 is awaiting completion an explanatory document.	

6.1 Terms of reference of the assessment

Question 1 of the catalogue concerned assessment of the conformity of standardization activity within the scope of Directive 97/23/EC with the principles set forth in

the German Consensus Statement issued by the Federal Ministry of Labour and Social Affairs, the highest occupational health and safety authorities of the German regional governments, the statutory accident insurance institutions, industry associations and trades unions, and the Deutsches Institut für Normung e.V. (DIN) concerning standardization within the scope of the directives pursuant to Article 118a of the EC Treaty (1993).

The legislative basis of Directive 97/23/EC is Article 95 of the EC Treaty. The function of standards for pressure equipment pursuant to this directive is to support the basic safety requirements for the product characteristics. The scope of Article 137 of the EC Treaty (formerly Article 118a) and occupational health and safety directives based upon it is not affected by this provision.

In accordance with the legislative basis of Directive 97/23/EC and with corresponding application of the principles of the "German Consensus Statement", the

German experts involved in the standardization activity were charged not to launch any provisions governing the health and safety of workers at work.

6.2 Results

The response to the question "Was the 'German Consensus Statement' observed during standardization activity?" was "Yes" in all responses received. The unanimous result of the questionnaire is that no standardization activity impacting upon the health and safety of workers at work has been launched by Germany.

Within the scope of the project, the standardization activity of the CEN/TCs responsible for plant and product standards was reviewed for provisions affecting the health and safety of workers at work. The review revealed that certain standards and standards projects contained provisions governing the health and safety of workers at work. These standards/draft standards were subjected to closer analysis and assessment (which extended to the guides contained in the annex to the "German Consensus Statement").

Standard, draft standard (CEN/TC) Description of the aspects studied	Result
prEN 764-6 Operating instructions (CEN/TC 54) Section 4.3 Commissioning Removal of the transport locks Information concerning the service fluid and the initial quantities Safety requirements for running up	Does not contain provisions governing in-plant organiza- tion. Specifies Annex I Section 3.4 - Manufacturer's user guides.
Section 4.4 Use/operation Description of the specified operating parameters Requirements for the qualification of operating personnel Reference to hazards arising from improper use	
Section 4.5 Maintenance and inspection - Manufacturer's recommendations for inspection intervals, including the safety equipment where applicable	
prEN 12952-8 Water-tube boilers and auxiliary installations - Part 8: Requirements for firing systems for liquid and gaseous fuels (CEN/TC 269) Section 7 Operating instructions and manual in relation to Annex B (informative) for the operation of firing systems under constant observation, in particular Deviations from proper use Inspection of the serviceability of the monitoring facilities Erection of compressed gas cylinders, pumps and evaporation stations	Contains provisions governing in-plant organization: technical and organizational requirements for the erection of auxiliary installations.
prEN 12952-9 Water-tube boilers and auxiliary installations - Part 9: Requirements for firing systems for pulverized solid fuel for the boiler (CEN/TC 269) Section 10 Operation and maintenance in relation to Annex A (informative) for the operation of firing systems under constant observation, in particular The deployment of operating personnel for monitoring of the firing systems Inspection of the monitoring facilities for serviceability Instruction of operating personnel in the handling of pulverized solid fuels	Contains provisions governing in-plant organization: organizational requirements for operation, safety checks, instruction of personnel

Standard, draft standard (CEN/TC) Description of the aspects studied	Result
DIN EN 13121-4 GRP tanks and vessels for use above ground - Part 4: Delivery, installation and maintenance (CEN/TC 210) Section 5 Installation - General handling - Preparations at the site of installation - Threaded joints - Visual inspections and load tests Section 6 Maintenance in relation to Annex E (informative) - Cleaning, maintenance - Repair and replacement of parts - Documentation	Does not contain provisions governing in-plant organization. Specifies Annex I Section 3.4 - Manufacturer's user guides concerning special requirements for transport, handling, assembly and maintenance of GRP vessels (owing to their low rigidity and mechanical strength of the laminate).
prEN 13458-3 Cryogenic vessels - Static vacuum-insulated vessels - Part 3: Operational requirements (CEN/TC 268) Section 4 Instruction of personnel in relation to Annex A (informative) - Proper use, behaviour in the event of faults - Personal protective equipment Section 5 General safety requirements - Hazard instructions - Operation of the installation - Cleanliness Section 6 Erection - Safety distances - Labelling of areas - Safe bleeding - Measures concerning maintenance and cleaning work - Characteristics of erection sites - Protection against mechanical damage Section 7 Testing - Testing prior to commissioning with the involvement of a third party - Periodic testing - Testing of safety valves and safety diaphragms	Contains provisions governing in-plant organization: comprehensive technical and organizational requirements which must remain within the domain of the health and safety of workers at work. Further regulates testing prior to commissioning and periodic testing, including such involving third parties. Such provisions are subject to national legislation.

Standard, draft standard (CEN/TC) Description of the aspects studied	Result
Section 9 Charging - Charging procedures - Technical and organizational measures applicable to charging	
Section 10 Decommissioning - Discharging, scrapping - Supplementary measures for storage for the purpose of subsequent operation	
Section 11 Maintenance - Modification of the design and subsequent testing by skilled persons/third parties	
Section 12 Supplementary requirements for flammable gases - Safety areas, fire-fighting clearances - Explosion protection measures - Gas warning systems, plant-related protective measures	
Section 13 Equipment for use in emergencies/behaviour in emergencies, in relation to Annex A (informative) Behaviour in the event of faults Technical measures for limitation of the effects	
WI 00268029: Cryogenic vessels - Static non-vacuum- insulated vessels - Part 3: Operational requirements (CEN/TC 268) Section 4 Instruction of personnel in relation to Annex A (informative) Proper use, behaviour in the event of faults Personal protective equipment	Contains provisions governing in-plant organization: comprehensive technical and organizational requirements which should remain within the domain of the health and safety of workers at work.
Section 5 General safety requirements - Hazard instructions - Operation of the installation	Further regulates tests prior to commissioning and periodic testing, including such involving
Section 6 Erection in relation to Annex B (informative) - Safety clearances - Safe bleeding - Measures for maintenance and cleaning work - Characteristics of erection sites	third parties. Such provisions are subject to national legislation.

Standard, draft standard (CEN/TC) Description of the aspects studied	Result
Section 7 Testing - Tests prior to commissioning involving third parties - Periodic testing	
Section 9 Charging - Charging procedure - Technical and organizational measures for charging	
Section 10 Decommissioning - Discharging, scrapping - Supplementary measures for storage for subsequent operation	
Section 11 Maintenance - Design modifications and subsequent testing by skilled personnel or third parties	
Section 12 Supplementary requirements for flammable gases Requirements for erection Safety areas, fire-fighting clearances Explosion protection measures Gas warning systems, plant-related protective measures	
Section 13 Equipment for use in emergencies/behaviour in emergencies, in relation to Annex A (informative) Behaviour in the event of faults Technical measures for limitation of the effects	
DIN EN 378-3 Safety and environmental requirements - Part 3: Installation site and personnel protection (CEN/TC 182)	Contains provisions governing in-plant organization: applicable to refrigeration units
Section 4 General requirements - Arrangements at the erection location - Fire-protection measures	with certain minimum quantities upwards (2.5 - 10 kg, according to the refrigerant type) and involv- ing comprehensive technical and
Section 5 Design and erection of special machine areas - Labelling, warning instructions - Characteristics of walls and doors - Ventilation measures	organizational requirements which must remain within the domain of the health and safety of workers at work.

Standard, draft standard (CEN/TC) Description of the aspects studied	Result		
Section 6 Electrical installations - Emergency lighting - Emergency-stop systems			
Section 7 Detectors and alarm systems - Gas warning installations - Monitoring of liquid circuits - Alarm systems, alarm trigger limits for ammonia (concentrations)			
Section 9 Personal protective equipment in relation to Annexes A , B and C (all informative) — Selection, provision and testing of breathing apparatus — Emergency and first-aid equipment			
DIN EN 378-4 Safety and environmental requirements — Part 4: Operation, maintenance, repair and recovery (CEN/TC 182)	Contains provisions governing in-plant organization: comprehensive technical and		
Section 4 User instructions - User instructions - Instruction of personnel	organizational measures which must remain within the domain of the health and safety of workers at work.		
Section 5 Maintenance and repair - Maintenance: competencies, protective measures applicable during performance of work - Monitoring for leaks - Repair: organizational measures, testing - Modification of the operating mode (conversion to a different refrigerant)	GI WOIK.		
Section 6 Requirements for recovery, re-use and disposal Disposal of refrigerant (where applicable, discharge to the atmosphere) Recovery: testing, where applicable reprocessing Transfer, transport and storage of refrigerant			

Standard, draft standard (CEN/TC) Description of the aspects studied	Result
prEN 13313 Refrigerating systems and heat pumps - Competence of personnel1) (CEN/TC 182) Section 4 General requirements - Criteria for the acquisition of expertise in the areas of design, erection, inspection, testing and commissioning, maintenance, repair, decommissioning and disposal of refrigeration systems Section 5 Requirements for training and for the assess- ment and maintenance of expertise	Contains provisions governing in-plant organization: concerning i.a. the qualification and certification of in-plant skilled personnel (e.g. for erection, inspection, testing, commissioning, maintenance, repair). Inplant competencies for testing (e.g. of pressure vessels, piping) are subject to national legislation.
prEN 13856 Minimum requirements for the content of the user manuals for automotive LPG systems (CEN/TC 286) Section 4 General conditions Drafting/language of the user manual Section 5 Content of the user manual Content of the technical information Information of relevance to safety Information concerning commissioning, regulation, op-	Does not contain provisions governing in-plant organiza- tion. Specifies Annex I Annex 3.4 - Manufacturer's user guides.
eration, maintenance	

prEN 13313 is a standardization project which does not form part of the mandate within the scope of Directive 97/23/EC.

7 Evaluation of transposition of the German regulations into European standards

7.1 Terms of reference of the assessment

Transposition of the German regulations is based upon the following agreement:

The incorporation of technical rules in accordance with § 11 of the German Equipment Safety Act (formerly § 24 of the Trade Regulation Act), through DIN, into European standards (CEN), of 18 May 1995 (Federal Labour Gazette, 6/1995, p. 51). Supplement to the agreement between the Federal Ministry of Labour and Social Affairs (BMA) and DIN regarding co-operation with the technical committees, of 15 December 1977 and 18 December 1989.

Under the terms of this agreement, the content of the German technical regulations is to be introduced, where required, into European standards by way of a defined procedure, in order for the national German safety standard for the characteristics of pressure equipment to be preserved.

The assessment of transposition to date of the German regulations into European standards for the areas of pressure vessels, piping and steam boilers was polled by questions 2-4 of the questionnaire. The project further examined special aspects of particular relevance to

safety. These aspects were also addressed in interviews with experts conducted on the basis of comprehensive questionnaires geared to the relevant area of expertise of the experts in question, including:

- Does the existing status of standardization activity give rise to approaches which represent modernization or further development in comparison with the existing German regulations?
- How is the safety standard for specific provisions of Annex I, for which stricter requirements apply in accordance with the existing German regulations, detailed in the standards?

7.2 Results

The pattern of responses was the same for all three greas.

Question 2: Has the technical content of the German regulations governing pressure equipment (TRB technical rules for pressure equipment – pressure vessels, AD pressure vessel code of practice, BG regulations, DIN standards and other technical regulations identified by the state of the art) been incorporated into the standards currently being drawn up, in particular in the EN 13445 "Unfired pressure vessels" series of standards?

Question 3: Has the technical content of the German regulations governing piping (TRR technical rules for pressure equipment – piping, AD pressure vessel code of practice (where applied), BG regulations, DIN standards and other technical regulations) been incorporated into the standards currently being drawn up, in particular in the EN 13480 "Metallic industrial piping" series of standards?

Question 4: Has the technical content of the German regulations governing steam boilers (technical rules for steam boilers, BG regulations, DIN standards and other technical regulations) been incorporated into the series of standards EN 12952 "Watertube boilers and auxiliary installations" and EN 12953 "Shell boilers" which are currently being drawn up?

Responses

Yes	×
a1) Sufficiently for preserva- tion of the existing national safety level	X
or	
a2) Only in part, safety deficits may arise	×
No	

The answers to a2) were supplemented by information on possible safety deficits:

- The German regulations have largely been transposed into European standards with regard to the material requirements.
- Representatives of the technical inspection organizations nevertheless expressed their reservations that it may not be possible to preserve the existing level of safety in the light of the changes in competencies, in particular with regard to the involvement of third parties in the conformity assessment procedure in accordance with Annex III of Directive 97/23/EC.

The three areas reveal specific gaps in comparison with the German regulations.

7.2.1 Pressure vessels

- Concerning for example
 - materials other than steel employed in pressure vessel construction (e.g. nickel and nickel-based alloys, copper and copper alloys) which are not addressed by the standards;
 - provisions governing time-dependent strength;
 - provisions governing particular aspects such as hydrogen-induced embrittlement;

7 Evaluation of transposition of the German regulations into European standards

- adequate quality verification for welding filler materials.
- Special standards, for example for expansion vessels, and certain standards for plant and plant components, such as liquefied petroleum gas equipment, refrigerating systems, deviate in some cases from the safety concept of the group standard prEN 13445 "Unfired pressure vessels". Different standards for the overall level of safety may therefore result for certain product groups.

7.2.2 Piping

- Concerning for example
 - materials other than steel employed in piping construction (e.g. aluminium and aluminium alloys, nickel and nickel-based alloys, copper and copper alloys, non-metallic materials) which are not addressed by the standards;
 - provisions governing time-dependent strength;
 - adequate quality verification for welding filler materials.

7.2.3 Steam boilers

Designs permitted for water-tube boilers which are not applied in accordance with the German regulations,
 e.g.

- weld-in sockets for unheated boiler tubes;
- pipe bends with large permissible out-of-roundness, in particular for pipe bends manufactured in twostage bending processes;
- pipe bends with wrinkle formation on the inside of the bend (intrados)
- Designs permitted for shell boilers which are applied with restrictions, if at all, under the German regulations, e.g.
 - designs with less stringent and less closely differentiated requirements upon the expansion distances;
 - Girder stays (explicitly banned by the TRD technical rules for steam boilers),
 - Set-on flat ends (according to the TRD technical rules for steam boilers, permissible only for low-pressure boilers);
 - inspection holes of inadequate diameter (Ø 420 in place of Ø 500 as specified in the TRD technical rules).

7.3 Analysis of particular aspects

7.3.1 New approaches in standardization

Analysis of the standards projects and evaluation of the interviews with selected

experts enabled the following new approaches to be identified, which represent modernization or further development with respect to the existing German regulations:

- The concept for the avoidance of brittle fracture based upon fracture mechanics. The concept brings
 - the test temperature and the impact work, and
 - the lowest permissible material temperature

into relation, whereby differentiation is made according to material group/ strength grade, wall thickness, and heat treatment status following welding.

- Design by the analysis method, based upon stress/expansion analysis in accordance with the finite-element method. As an alternative to design by formulae, which is based upon the general membrane stress state in conjunction with specified coefficients and design rules, the analysis method represents an alternative for
 - the use of steels with high yield/ proof strength, for example the fine-grain structural steels increasingly used by German manufacturers;

- the development of new designs, by which technical progress is to be promoted.
- Detailed specification of the raw materials and demonstration of the resistance to chemical attack for glassfibre-reinforced plastics (GRP), extension of the areas of application with regard to media and temperatures (list of approved products).
- New methods for the calibration of test equipment.

7.3.2 Detailing of certain specifications of Annex I

Analysis of the standards projects reveals certain aspects in the detailing of certain specifications of Annex I for which stricter requirements apply in the German regulations. A example of these aspects is described briefly below owing to its particular relevance to safety.

In Section 7.2 of Annex I, exploitation of the permissible design stress in welded joints is limited by the values for the joint coefficient ("welding factor") of 0.7/0.85/1.0. The values for the joint coefficient depend essentially upon the scale of the manufacturer's in-process nondestructive testing. Proven regulations such as the AD pressure vessel code of practice and TRD technical rules for steam boilers make provision

7 Evaluation of transposition of the German regulations into European standards

for a minimum scale of destructive and/or nondestructive tests for continuous surveillance of the manufacturing quality. Accordingly, these regulations do not make provision for particularly low joint coefficient values (0.85/1.0 for AD, 0.8/0.9/1.0 for TRD). The joint coefficient of 0.7 combined with visual inspection, with no form of destructive or nondestructive testing, implies that the uncertainty of undetected impermissible welding errors is to be compensated for by overdimensioning by a factor of 1/0.7 = 1.42 (i.e. an increase in wall thickness of 42%).

In order to support this requirement, standardization was faced with the task

of developing a concept involving supplementary measures for the assurance of an equivalent overall level of safety. The German experts in CEN/TC 54 were substantially involved in launching and developing this concept and carrying it through. The concept is set forth in prEN 13445-5 "Unfired pressure vessels - Part 5: Inspection and testing". It classifies pressure vessels in a basic pattern comprising four test groups. The test groups are defined by the scope of nondestructive testing and the joint coefficients applied during design/analysis. This system is shown in the representation of the test group basic pattern below, which is a greatly simplified form of Table 6.5.1.1-1 of prEN 13445-5.

	Test group			
	1	2	3	4
Scope of non-destructive testing of critical welded joints	100 %	100–10 %	25–10 %	0 %
Joint coefficient	1.0	1.0	0.85	0.7

The basic pattern is differentiated further in prEN 13445-5 by test sub-groups, by the inclusion of additional factors with a bearing upon safety, such as

- material groups for consideration of the technological characteristics relevant during fabrication/manufacture;
- permissible wall thickness ranges classified by material group;
- welding processes employed;
- permissible operating temperature range.

These influencing factors are combined in the test groups and test sub-groups

with the aim of attaining a uniform safety level. For the pressure vessels falling within test group 4 with the joint coefficients 0.7, however, additional measures are necessary in the experts' opinion in order to uphold the principle of equivalence with the uniform safety level.

The supplementary measures extend in some cases beyond the provisions of Directive 97/23/EC. They are shown in the following summary, in which the reference to the safety concept of Directive 97/23/EC is shown from the aspect of the potential hazard and the probability of failure.

Supplementary measures $^{1)}$ for pressure vessels with a joint coefficient of 0.7 for harmonization of the safety level

Limitation of the potential hazard

- Group 2 fluids only (with less hazardous characteristics than Group 1 fluids)
 Pressure PS < 20 bar
- Pressure-volume product
 PS×V ≤ 20000 bar litres when TS > 100 °C
 bzw.
 PS×V ≤ 50 000 bar litres when TS ≤ 100 °C

Reduction of the probability of failure

- Material groups 1.1 and 8.1²⁾ only
- Max. 500 full load cycles over the entire service life³⁾
- Lower permissible design stress
- Pressure test at increased test pressure⁴)

For this reason, pressure vessels with a joint coefficient of 0.7 are permissible only for primarily static loading. This restriction requires further supplementary measures; refer in this respect to Footnote 4.

¹ All measures are to be applied cumulatively.

Ferritic unalloyed and low-alloyed steels with yield strengths of up to 275 N/mm² and austenitic stainless steels with Cr ? 19%; these steels are non-critical with regard to their treatment, in particular welding and heat treatment.

Pressure vessels not subject to cyclic loading in operation are designed to withstand primarily static loading. A minimum of 500 full load cycles (run-up and shut-down) is also guaranteed by this design alternative. Pressure vessels subject to cyclic loading in operation and which must withstand over 500 full load cycles (or equivalent pressure fluctuations) must be engineered with adequate alternating fatigue strength, and compliance with this provision demonstrated. As certain impermissible welding errors are critical for the early formation and spread of fatigue cracking, surveillance of the welding quality for faults by means of non-destructive testing is essential in this case.

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The experience gained to date is not sufficient to rule out generally the possibility of certain impermissible welding fault types, such as cracks or lack of sidewall fusion, leading to damage with a bearing upon safety, up to and including failure, even below the 500 full-load cycles which are to be guaranteed. Certain limit conditions must be met, for example geometrical defects such as peaking, out-of-roundness, weld reinforcement.

Corresponding studies of pressure vessels with joint coefficients of 0.7 were performed within the framework of the European HYDFAT research project. The results obtained were used to define conditions for performance of a pressure test at increased test pressure. The purpose of these conditions is to improve the safety standard, in particular with regard to the required number of full-load cycles.

Based upon the results from the HYDFAT project, the following increased test pressure factors were defined in prEN 13445-5 in place of the test pressure factor 1.25 in accordance with Section 7.4 of Annex I (effective 4 April 2001/N500 rev. 7):

Material group	Test pressure factor, selection criteria	
1.1 Ferritic unalloyed and low- alloyed steels with a yield	2,2	Peaking + 0.5 weld reinforcement ≤ 0.5 wall thickness Corrosion allowance < 1 mm
strength ≤ 275 N/mm ²	2,0	Peaking + 0.5 weld reinforcement ≤ 0.75 wall thickness Peaking ≤ 0.5 wall thickness Weld reinforcement ≤ 0.75 wall thickness Corrosion allowance ≥ 1 mm
8.1 Austenitic stainless steels with Cr ≤ 19 %	1,85	Peaking + 0.5 weld reinforcement ≤ 0.5 wall thickness

Note: Working Group E of CEN/TC 54 has not concluded deliberation of the final values for increased test pressure factors.

8.1 Terms of reference of the assessment

Question 5 on the questionnaire addresses this issue. It concerns assessment by the German experts of the need for standardization, based upon the current status of European standards and standards projects.

The need for standardization was estimated in terms of gaps in the technical safety provisions and omissions from the German regulations and the state of the art for characteristics described within them. The need for standardization identified by German experts may therefore differ from that described by individual CEN/TCs in their business plans ("CEN/TC ... Structure; Market, Environment and Objectives"). The business plans can be accessed from the CEN database through the cenorm.be Internet portal.

8.2 Results

8.2.1 General overview

The following general conclusions can be drawn from the analysis of the results from the questionnaire and of the interviews with selected experts:

The unanimous consensus is that the most important task lies in consolidation of the harmonized standards, particularly

the series of standards governing the relevant areas of

- pressure vessels (EN 13445 Unfired pressure vessels);
- piping (EN 13480 Metallic industrial piping);
- steam boilers (EN 12952 Water-tube boilers and auxiliary installations; EN 12953 Shell boilers).

Revision of these standards is considered necessary once sufficient experience has been gained in their application. The objective is to ensure the standards' suitability for application in practice, and thereby their acceptance.

The unanimous consensus is that a second major task lies in extending the scope of the series of standards for the above areas to include subjects which are regarded as specific gaps in the standards' technical content in comparison with the German regulations.

The consensus is that no new standards projects need be launched by the CEN/TCs and ECISS/TCs under consideration. The area of piping, for which a new standard governing plastic pipes is deemed necessary by all parties questioned, represents an exception. As the series of standards covers metallic piping only, a new standard may be necessitated by the structure of the standards.

8.2.2 Analysis of the individual CEN/TCs

Question 5, "Does a need for standardization exist beyond the existing standards/standards projects?", prompted different responses according to the TC concerned.

a) CEN/TC 54 Unfired pressure vessels

Yes	×
a1) Affecting existing stand- ards/standards projects ¹⁾ – Revision – Extension of the scope	X
a2) Affecting the drafting	
No	

Where the answer was "Yes", multiple answers were possible under a1).

The need for standardization

Revision of existing standards/standardization projects

In the opinion of those questioned, the need primarily concerns revision of the EN 13445 series of standards, Unfired pressure vessels, following its adoption, with the objectives of:

eliminating inconsistencies and errors revealed in practice,

- achieving greater harmony between the various parts of standards, in order to assure a cohesive overall concept,
- assuring suitability for practical application.

Extension of the scope of existing standards/standardization projects by addition of the following scope:

- materials other than steel:
 - nickel and nickel-based alloys,
 - copper and copper alloys,
 - titanium and titanium alloys,
- design for time-dependent strength (creep strength),
- further development of the process for design by analysis,
- provisions governing particular aspects such as stress corrosion cracking, hydrogen-induced embrittlement.

Note:

The following subjects are listed as future standards projects in the business plan of CEN/TC 54:

- non-ferrous metals and non-metallic materials;
- design under creep conditions;
- design by analysis for high-yield materials;
- experimental design procedures.

b) CEN/TC 267 Industrial piping and pipelines

Yes	X
a1) Affecting existing stand- ards/standards projects ¹⁾ – Revision – Extension of the scope	X
a2) Affecting the drafting	×
No	

Where the answer was "Yes", multiple answers were possible under a1).

The need for standardization

Revision of existing standards/standardization projects

In the opinion of those questioned, the need primarily concerns revision of the EN 13480 series of standards, Metallic industrial piping, following its adoption, with the objectives of

- eliminating inconsistencies and errors revealed in practice,
- achieving greater harmony between the various parts of standards, in order to assure a cohesive overall concept,
- assuring suitability for practical application.

Extension of the scope of existing standards/standardization projects by addition of the following subjects:

- materials other than steel:
 - aluminium and aluminium alloys
 - nickel and nickel-based alloys
 - copper and copper alloys
- titanium and titanium alloys
- Design for time-dependent strength (creep strength)

Drafting of a new standard

Plastic piping (glassfibre-reinforced plastic (GRP), thermoplastics)

Note:

The following subjects are addressed as future standards projects in the business plan of CEN/TC 267:

- non-ferrous metals;
- plastics (glassfibre-reinforced plastics/ GRP, thermoplastics); the launching of corresponding standards projects is still under discussion.

c) CEN/TC 269 Shell and water-tube boilers

Yes	\boxtimes
a1) Affecting existing stand- ards/standards projects ¹⁾ – Revision – Extension of the scope	\boxtimes
a2) Affecting the drafting	
No	

Need for standardization

Revision of existing standards/standardization projects

In the opinion of those questioned, the need primarily concerns revision of the EN 12953 series of standards, Shell boilers, following its adoption, with the objectives of:

- eliminating inconsistencies and errors revealed in practice,
- achieving greater harmony between the various parts of standards, in order to assure a cohesive overall concept,
- assuring suitability for practical application.

Note:

No subjects for future standards projects have been defined explicitly in the business plan of CEN/TC 269.

d) CEN/TC 74 Flanges and their joints

Yes	X
a1) Affecting existing stand- ards/standards projects ¹⁾ – Revision – Extension of the scope	X
a2) Affecting the drafting	
No	

Where the answer was "Yes", multiple answers were possible under a1).

Need for standardization

Revision of existing standards/standardization projects

In the opinion of those questioned, the need primarily concerns revision of the standardization projects currently in progress following their adoption, with the objectives of:

- eliminating inconsistencies and errors revealed in practice,
- achieving greater harmony between the various parts of standards, in order to assure a cohesive overall concept,
- assuring suitability for practical application.

A need further exists for revision and updating of standards governing

- design rules for flanged joints,
- gasket parameters.

Extension of the scope of existing standards/standardization projects by addition of the following subjects:

- new gasket types
- flanges manufactured from copper and copper alloys

Note:

No subjects for future standards projects have been defined explicitly in the business plan of CEN/TC 74.

e) CEN/TC 69 Industrial valves CEN/TC 210 GRP tanks and vessels CEN/TC 268 Cryogenic vessels CEN/TC 286 Liquefied petroleum gas equipment and accessories CEN/TC 182 Refrigerating systems, safety and environmental requirements

The results for the above CEN/TCs are the same.

Yes	X
a1) Affecting existing stand- ards/standards projects — Revision — Extension of the scope	× □
a2) Affecting the drafting	
No	

Need for standardization

Revision of existing standards/standardization projects

In the opinion of those questioned, the need primarily concerns revision of the standardization projects currently in progress following their adoption, with the objectives of:

- eliminating inconsistencies and errors revealed in practice,
- achieving greater harmony between the various parts of standards, in order to assure a cohesive overall concept,
- assuring suitability for practical application

Note:

No subjects for future standards projectshave been defined explicitly in the business plans of the above CEN/TCs.

8.2.3 Further suggestions

The German Committee for Beverage Dispenser Equipment (DAGSch) perceives a general requirement for standardization in the area of dispenser equipment. Owing to the minor significance of the sector in relation to Directive 97/23/EC, CEN is conducting no pressure equipment standards projects on beverage dispenser equipment at the present time. Work has already begun on creation of a national standard.

9 Summary and final evaluation of the results

9.1 Present status of standardization

Standardization within the scope of Directive 97/23/EC is based upon European Commission Mandate M/071 issued in 1994, and comprises some 800 standards, classified as

- harmonized EN and harmonized supporting EN standards (including material standards);
- supporting EN standards (including basic and horizontal standards).

19 Technical Committees in CEN and 9 Technical Committees in ECISS are involved in handling this comprehensive standardization activity. Basic standards projects for pressure equipment had in some cases already been launched prior

to issuing of the mandate. The legislative basis for the continuation and finalization of standardization activity was not created until the adoption of Directive 97/23/EC on 29 May 1997, however.

One of the strategic objectives of the Commission for successful implementation of Directive 97/23/EC is that the harmonized standards for the essential areas of pressure vessels, piping and steam boilers should be available by expiry of the transitional period on 29 May 2002.

Analysis of the status of standardization reached to date shows that the basic series of standards have for the greater part reached the final draft stage for formal voting and are in some cases already at the final voting stage.

Area/series of standards	Progress (29 June 2001)
Pressure vessels EN 13445 Unfired pressure vessels	The final drafts for formal voting have been completed only in part. The deadline is jeopar-dized/intervention by the Commission (new schedules, monitoring of deadlines).
Piping EN 13480 Metallic industrial piping	The final drafts for formal voting are in some cases complete. The deadline is attainable.
Steam boilers EN 12952 Water-tube boilers and auxiliary installations EN 12953 Shell boilers	Formal voting has commenced. The deadline is attainable.

Amendments to technical content and to the structure of the above series of standards have been made under intense time pressure during debate of the objections, and even following its conclusion. The result of assessment of the final drafts by the CEN Consultant prior to formal voting is of particular importance. The drafting process of some standards parts is still in full spate, in particular in the EN 13445 series of standards on unfired pressure vessels.

Minor adjustments in accordance with the changes made at short notice were therefore necessary during creation of the updated directories of the standards projects. These amendments, which have already been implemented at CEN/TC level, are in some cases not yet reflected in the CEN database, for example because the formal decisions of the CEN/BT are still pending.

9.2 Conformity with the "German Consensus Statement"

The European standardization activity supported by German experts was evaluated for conformity with the "German Consensus Statement". The evaluation was conducted in consideration of the legislative basis of Directive 97/23/EC and with application of the principles of the "German Consensus Statement".

The unanimous result of the questionnaire is that no standardization activity has been launched by Germany in the area of the health and safety of workers at work. Within the scope of the project, the standardization activity of the CEN/ TCs responsible for plant and product standards was reviewed for provisions impacting upon the area of company organization, in particular those affecting the health and safety of workers at work. In the course of closer analysis and assessment, provisions governing the health and safety of workers at work were noted in the following standards and standards projects:

Germany should pursue the following objective with greater vigour during revision of these standards or work still in progress:

Provisions governing company organization, where they affect

- safety-related information concerning erection, commissioning, operation, maintenance, including inspection by the user,
- information provided by the manufacturer concerning residual risks, as a consequence of risk analysis and
- information provided by the manufacturer concerning hazards arising from improper use,

9 Summary and final evaluation of the results

Standard/standardization project (CEN/TC)	Result: contain provisions governing in-plant organization, e.g
prEN 12952-8 Water-tube boilers and auxiliary installations – Part 8: Requirements for firing systems for liquid and gaseous fuels (CEN/TC 269)	Technical and organizational requirements for the erection of auxiliary installations
prEN 12952-9 Water-tube boilers and auxiliary installations – Part 9: Requirements for firing systems for pulverized solid fuel for the boiler (CEN/TC 269)	Organizational requirements for operation, safety checks, instruction of personnel
prEN 13458-3 Cryogenic vessels - static vacuum insulated vessels - Part 3: Operational requirements WI 00268029 Cryogenic vessels - Static non-vacuum insulated vessels - Part 3: Operational requirements (CEN/TC 268)	Technical and organizational requirements for erection, operation, fault-mode behaviour, PPE Tests prior to commissioning, periodic tests
DIN EN 378-3 Refrigerating systems and heat pumps — Safety and environmental requirement — Part 3: Installation site and personal protection (CEN/TC 182)	Technical and organizational requirements for erection (machinery spaces, fire protection, ventilation) PPE, emergency and first aid eqipment
DIN EN 378-4 Refrigerating systems and heat pumps – Safety and environmental requirements - Part 4: Operation, maintenance, repair and recovery (CEN/TC 182)	 Organizational requirements for user instructions, personnel Technical and organizational requirements for maintenance and repair, modifications to the operating mode, testing Disposal, handling, storage of refrigerants
prEN 13313 Refrigerating systems and heat pumps - Competence of personnel (CEN/TC 182)	Requirements for the qualification and certification of personnel for operation and testing Test competencies

should be transposed in requirements for the drafting of instruction handbooks in accordance with Annex I Section 3.4.

Provisions concerning company organization other than those stated above should be removed from standards based on Directive 97/23/EC. Such provisions must remain within the domain of regulations governing the health and safety of workers at work. In addition, harmonized standards for pressure equipment must not contain any provisions governing in-plant tests, which also remain subject to national legislation.

9.3 Transposition of German regulations

The European standardization activity supported by Germany was evaluated with respect to implementation of the agreement concluded between the Federal Ministry of Labour and Social Affairs (BMA) and DIN on the introduction of technical rules in accordance with § 11 of the German Equipment Safety Act (GSGV) (formerly § 24 of the Trade Regulation Act) through DIN into European standards (CEN). The objective of this agreement is to preserve the national safety standard for the characteristics of pressure equipment by the introduction, where required, of content from the German body of regulations.

The results of the questionnaire indicate that the agreement between the BMA and DIN has been implemented and substantial parts of the national regulations and the associated safety concepts transposed under the specified terms of reference.

The majority view of the experts is however that the transposition could not be carried through sufficiently in certain areas. Safety deficits which are not present in the German regulations may consequently arise. Particular reasons for this are:

- ☐ Harmonization of the national regulations, in the course of European standardization, to the common denominator of Directive 97/23/EC requires compromises on the part of the parties involved. In the course of European standardization activity,
 - different safety philosophies,
 - different design principles,
 - different surveillance strategies and test methods

in the various CEN member countries come into play.

The principles of standardization activity, e.g.

 the need for a consensus to be reached between experts on standards committees, and

9 Summary and final evaluation of the results

 majority voting in accordance with the weightings of the CEN members

reduce the scope for national standpoints to be carried through.

☐ Substantial parts of the German regulations have been transposed within the scope of material requirements.

Within the German regulations, these

requirements are closely related to the concept of product-oriented testing by neutral third parties. Representatives of the technical inspection organizations have their reservations that owing to the change in competencies, in particular regarding the involvement of third parties in the conformity assessment procedure in accordance with Annex III of Directive 97/23/EC.

Areas covered by national regulations but not by European standards

Pressure vessels: EN 13445 series of standards, Unfired pressure vessels (CEN/TC 54)

- Metallic materials other than steel
 - Nickel and nickel-based alloys
 - Copper and copper alloys
- Provisions governing the time-dependent strength
- Provisions governing special aspects such as stress corrosion cracking, hydrogen-induced embrittlement
- Adequate quality verification for welding filler materials

Piping: EN 13480 Metallic industrial piping (CEN/TC 267)

- Metallic materials other than steel
 - Aluminium and aluminium alloys
 - Nickel and nickel-based alloys
 - Copper and copper alloys
- Non-metallic materials
- Provisions governing the time-dependent strength
- Adequate quality verification for welding filler materials

Steam boilers: EN 12952 series of standards, Water-tube boilers and auxiliary installations EN 12953 series of standards, Shell boilers

- Designs permitted for water-tube boilers which are not applied or not permitted in accordance with the German regulations, e.g.
 - Weld-in sockets for unheated boiler tubes;
 - Pipe bends with large permissible out-of-roundness, in particular for pipe bends manufactured in two-stage bending processes;
 - Pipe bends with wrinkle formation on the inside of the bend (intrados)
- Designs permitted for shell boilers which are not appllied or not permitted under the German regulations, e.g.:
 - Less stringent and less closely differentiated requirements upon the expansion distances
 - Girder stays
 - Set-on flat ends, not only for low-pressure boilers
- Inspection holes of inadequate diameter (Ø 420 in place of Ø 500 as specified in the TRD technical rules)

it will not be possible to preserve the former safety level.

☐ Specific gaps are identified which may lead to safety deficits and which are not present in the German regulations. These deficits, caused in part by the restriction in the scope of the standards owing to time pressures, are shown in the overview below for the areas analysed.

The EN 13445 "Unfired pressure vessels" series of standards is a group standard which is intended to set an example for the pressure equipment sector. Owing to the breadth of its scope, it is not generally easy to use. For clearly delimited types or families of pressure equipment, the drafting of special standards will undoubtedly be a practical solution for users. Such standards projects are generally launched by agreement between interested parties, for example groups of manufacturers. Owing to the particular scope of such standards, the involvement of a wide group of experts beyond the parties launching the project need hardly be anticipated. As experience to date has also shown, the possibility cannot be excluded of such standards deviating from the safety concept of the group standard EN 13445, and the specified overall level of safety being compromised. Consequently, different safety standards may result for certain product groups, with unfavourable consequences for the

health and safety of workers at work. The progress of such standards projects should be monitored by Germany, even where direct involvement is not foreseen, in order to permit intervention and correction should this be necessary.

Two particular aspects were also studied:

☐ New approaches in standardization.

The analysis of the standards projects reveals new approaches in European standardization which represent modernization or further development with respect to the existing German regulations. Examples include:

- the concept for the avoidance of brittle fracture of pressure vessels, based upon fracture mechanics;
- design by the analysis method, based upon stress/expansion analysis in accordance with the finiteelement method;
- detailed specification of the raw materials and demonstration of the resistance to chemical attack for glassfibre-reinforced plastics (GRP), extension of the areas of application with regard to media and temperatures (list of approved products);
- new methods for the calibration of test equipment.

9 Summary and final evaluation of the results

☐ Detailing of certain provisions of Annex I for which stricter requirements apply in the German regulations.

The issue of pressure vessels with the ioint coefficient 0.7 has been identified as an example with a bearing on safety, and studied. A concept with a basic pattern of four test groups has been developed in standards for unfired pressure vessels. Combination of the joint coefficients, the extent of nondestructive testing during manufacture, and further substantial influencing factors is to assure a uniform overall level of safety for all test groups. Additional measures were deemed essential for pressure vessels with the joint coefficient of 0.7, however. These measures extend in some cases beyond the provisions of Directive 97/ 23/EC, and comprise

- limitation of the potential hazard (fluid group, pressure, and pressure-volume product), and
- reduction in the probability of failure (non-critical materials, primarily static loading in operation, performance of pressure testing at increased pressure).

In the interests of the in-plant safety of pressure vessels with the joint coefficient 0.7, special regulations are expected to be required for periodic pressure tests, with restrictions with regard to gas pressure testing.

9.4 Need for standardization

The need for standardization was assessed from the perspective of safety deficits and absence of coverage in comparison with the German regulations and the state of the art described within them. The need for standardization identified by German experts may therefore differ from that described by individual CEN/TCs in their business plans.

Evaluation of the results of the questionnaire reveals that in the unanimous view of the experts, the following tasks should be a matter of priority in future standardization activity:

- consolidation of the harmonized standards, in particular the series of standards governing the relevant subjects
 - pressure vessels (EN 13445 Unfired pressure vessels);
 - piping (EN 13480 Metallic industrial piping);
 - steam boilers (EN 12952 Watertube boilers and auxiliary installations; EN 12953 Shell boilers).

Revision of these standards once sufficient experience has been gained in their application is considered necessary. The objectives are

- to eliminate inconsistencies and errors identified during practical application;
- to achieve greater harmony between the various parts of standards, in order to assure a cohesive, functioning overall concept;
- to ensure the standards' suitability for practical application, and thereby their acceptance.
- extension of the scope of the above series of standards by the addition of subjects which, in the current status of the standards, are regarded as specific deficiencies in the technical content in comparison with the German regulations.

The consensus is that no requirement exists for new standards projects to be launched by the CEN/TCs and ECISS/TCs analysed. The area of piping, for which a new standard governing plastic pipes is deemed necessary by all parties questioned, represents an exception. As the series of standards covers metallic piping only, a new standard may be required in order to retain the structure of standardization in this field.

The need for standardization identified by the experts, with the exception of the requisite revision of existing standards/standards projects, is shown below with reference to the CEN/TC concerned.

The German Committee for Beverage Dispenser Equipment (DAGSch) perceives a general requirement for standardization of the area of dispenser equipment. Owing to the minor significance of the sector in relation to Directive 97/23/EC, CEN is conducting no standards projects on the subject of beverage dispenser equipment at the present time. Work has already begun on creation of a national standard.

9.5 Future prospects

A comprehensive European body of standards for pressure equipment, based upon both proven manufacturing practice and modern approaches, is currently taking shape. Essential parts of the German regulations and the associated safety concepts have been transposed into this European body of standards by the German experts involved in the standardization activity.

The standardization activity must be continued into the future, in order to eliminate unavoidable inconsistencies and, where arising, errors, to remove safety deficits where detected, and to extend the scope according to the requirements in practical application.

9 Summary and final evaluation of the results

Need for standardization

CEN/TC 54 Unfired pressure vessels

Extension of the scope of existing standards/standardization projects by the addition of the following subjects

- Metalic materials other than steel
 - Nickel and nickel-based alloys
 - Copper and copper alloys
 - Titanium and titanium alloys
- Design for time-dependent strength (creep strength)
- Elaboration of the method for design by analysis
- Provisions governing special aspects such as stress corrosion cracking, hydrogen-induced embrittlement

CEN/TC 267 Industrial piping and pipelines

Extension of the scope of existing standards/standardization projects by the addition of the following subjects

- Metalic materials other than steel
 - Aluminium and aluminium alloys
 - Nickel and nickel-based alloys
 - Copper and copper alloys
 - Titanium and titanium alloys
- Non-metallic materials
- Provisions governing time-dependent strength
- Adequate quality verification for welding filler materials

CEN/TC 74 Flanges and their joints

Extension of the scope of existing standards/standardization projects by the addition of the following subjects

- Designs permitted for water-tube boilers which are not permitted in accordance with the German regulations, e.g.
 - New gasket types
 - Flanges manufactured from copper and copper alloys
- A need also exists for revision and updating of the content of existing standards governing, in particular,
 - Design rules for flanged joints
 - Gasket parameters

In conjunction with Directive 97/23/EC, the European body of standards for pressure equipment offers users a greater degree of freedom than is generally the case with the existing German regulations. A greater degree of technical knowledge, and consequently the in-

volvement of qualified consultants, is necessary, in particular for invitations to tender, inquiries, ordering, and the drafting of order specifications. Not only engineering bureaux and test organizations, but also the institutions for statutory accident insurance and prevention (BGs)

will be called upon to provide this exper-

A concluding evaluation of the initial issues of harmonized standards for pressure equipment which will be available shortly, in particular those for unfired pressure vessels (EN 13445), metallic piping (EN 13480) and steam boilers (EN 12952 and EN 12953), is only ever possible with hindsight. Only when sufficient experience has been gained in ap-

plication, and following the necessary revision, can the suitability of the standards for practical use and the competitiveness of the pressure equipment with regard to safety and economy be evaluated.

The standardization activity for the elimination of deficits in identified areas should however be initiated in the interim

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- 6/ Recommendations for the application of the results of HYDFAT to the construction of unfired vessels. EPERC Bulletin No. 4
- 7/ Einbringung von Technischen Regeln nach § 11 Gerätesicherheitsgesetz

- (früher: § 24 Gewerbeordnung) über DIN in die Europäische Normung (CEN) vom 18. Mai 1995 (incorporation of technical rules in accordance with § 11 of the Equipment Safety Act (formerly § 24 of the Trade Regulation Act), through DIN, into European standards (CEN), reached on 18 May 1995) (Bundesarbeitsblatt (Federal Labour Gazette) 6/1995, p. 51). – Ergänzung der Vereinbarungen mit dem DIN über die Zusammenarbeit mit den Technischen Ausschüssen vom 15. Dezember 1977 und vom 18. Dezember 1989 (Supplement to the agreement between the Federal Ministry of Labour and Social Affairs (BMA) and DIN regarding co-operation with the technical committees reached on 15 December 1977 and 18 December 1989)
- 8/ Gemeinsamer Standpunkt (German Consensus Statement) issued by the Federal Ministry of Labour and Social Affairs, the highest occupational health and safety authorities of the German regional governments, the accident insurance institutions, industry associations and trades unions, and the Deutsches Institut für Normung e.V. (DIN) concerning standardization pursuant to the directives based upon Article 118a of the EC Treaty (1993). In: Bundes-

- arbeitsblatt (Federal Labour Gazette) 1/1993, p. 37-39.
- 9/ Berufsgenossenschaftliche Mitarbeiter in den Gremien der Europäischen Normung, January 2001 issue. Hauptverband der gewerblichen Berufsgenossenschaftliche Zentrale für Sicherheit und Gesundheit BGZ
- 10/ Normenausschuss Chemischer Apparatebau (Standards Committee for Chemical Apparatus Engineering, FNCA) in DIN Annual Report 2000
- 11/ Normenausschuss Rohrleitungen und Dampfkesselanlagen (Standards Committee for Piping and Steam Boilers, NARD) in DIN – Annual Report 2000
- 12/ Normenausschuss Kältetechnik (Standards Committee for Refrigeration Engineering, FNKä) in DIN – Annual Report 1999/2000
- 13/ Normenausschuss Armaturen (Standards Committee for Valves, NAA) in DIN – Annual Report 2000
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- 17/ Lorenz, H.: Herstellung von Wasserrohrkesseln nach der Normenreihe EN 12952 (Manufacture of watertube boilers in accordance with the EN 12952 series of standards). Gemeinschaftstagung Dampfkessel Praktische Erfahrungen bei der Anwendung europäischer Rechtsvorschriften und Normen (Joint conference on steam boilers practical

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- 19/ Szusdziara, S.: Erfahrungen aus der Sicht des Herstellers (Experience

- from the manufacturer's perspective)
 Gemeinschaftstagung Dampfkessel –
 Praktische Erfahrungen bei der Anwendung europäischer Rechtsvorschriften und Normen (Joint conference on steam boilers practical experience in the application of European statutory provisions and standards) in Duisburg, Germany,
 21 February 2001
- 20/ Schulz, T.: Gefahrenpotenzial bei Gasdruckprüfungen (Potential hazard associated with gas pressure tests). In: Sichere Chemiearbeit Nr. 7/1992, p. 86 (published by BG Chemie, the institution for statutory accident insurance and prevention in the chemical industry)

Annex 1 New Approach directives which make provision for CE marking

Di	rective relating to	Number/Amendment
1	Electrical equipment designed for use within certa	nin voltage limits 73/23/EEC 93/68/EEC
2	Simple pressure vessels	87/404/EEC 90/488/EEC, 93/68/EEC
3	Toys	88/378/EEC 93/68/EEC
4	Construction products	89/106/EEC 93/68/EEC
5	Electromagnetic compatibility	89/336/EEC 92/31/EEC, 93/68/EEC, 98/13/EC
6	Machinery	98/37/EC 98/79/EC
7	Personal protective equipment	89/686/EEC 93/68/EEC, 93/95/EEC, 96/58/EEC
8	Non-automatic weighing instruments	90/384/EEC 93/68/EEC
9	Active implantable medical devices	90/385/EEC 93/42/EEC, 93/68/EEC
10	Appliances burning gaseous fuels	90/396/EEC 93/68/EEC
11	Hot-water boilers fired with liquid or gaseous fuel	s 92/42/EEC 93/68/EEC
12	Explosives for civil uses	93/15/EEC
13	Medical devices	93/42/EEC 98/79/EC
14	Explosive atmospheres	94/9/EC
15	Recreational craft	94/25/EC
16	Lifts	95/16/EC
17	Electric refrigerators and freezers	96/57/EC
18	Pressure equipment	97/23/EC
19	Telecommunications terminal equipment	98/13/EC
20	In vitro diagnostic medical devices	98/79/Ec
21	Radio equipment and telecommunications termin	al equipment 99/5/EC

Annex 1 New Approach directives which make provision for CE marking

Note:

The following New Approach or Global Approach directives which do not make provision for CE marking have also been noted:

Directive relating to	Number/Amendment
1 Packaging and packaging waste	94/62/EC
2 Trans-European high-speed rail system	96/48/EC
3 Marine equipment	96/98/EC

Annex 2 Directive 97/23/EC Scope and selected concepts

Scope (Article 1 (1)):

This Directive applies to the design, manufacture and conformity assessment of pressure equipment and assemblies with a maximum allowable pressure PS greater than 0,5 bar.

Definitions:

Pressure equipment

Vessel a housing designed and built to contain fluids under pressure including its direct attachments up to the coupling point connecting it to

other equipment. A vessel may be composed of more than one

chamber.

- Piping piping components intended for the transport of fluids, when con-

nected together for integration into a pressure system. Piping includes in particular a pipe or system of pipes, tubing, fittings, expansion joints, hoses, or other pressure-bearing components as appropriate. Heat exchangers consisting of pipes for the purpose of

cooling or heating air shall be considered as piping.

- Safety accessories devices designed to protect pressure equipment against the allowa-

ble limits being exceeded. Such devices include:

devices for direct pressure limitation, such as safety valves, bursting disc safety devices, buckling rods, controlled safety pressu-

re relief systems (CSPRS), and

 limiting devices, which either activate the means for correction or provide for shutdown or shutdown and lockout, such as pressure switches or temperature switches or fluid level switches and 'safety related measurement control and regulation (SRMCR)' devices.

- Pressure accessories devices with an operational function and having pressure-bearing

housings.

Assemblies several pieces of pressure equipment assembled by a manufacturer

to constitute an integrated and functional whole

Fluids gases, liquids and vapours in pure phase as well as mixtures the-

reof. A fluid may contain a suspension of solids.

Annex 3 Guidelines related to the application of the Pressure Equipment Directive 97/23/EC

Sub	pjet	Classification of the Guidelines ¹
1	Scope and exclusions of the directive	1/yy
2	Classification and categories	2/уу
3	Assemblies	3/уу
4	Evaluation assessment procedures	4/yy
5	Interpretation of the essential requirements on design	5/уу
6	Interpretation of the essential requirements on manufacturing	6/уу
7	Interpretation of the essential requirements on materials	7/уу
8	Interpretation of other essential requirements	8/yy
9	Miscellaneous	9/уу
10	General/Horizontal issues	10/уу

¹ The guidelines carry a x/y type numbering. The first number (x) relates to the subject, the second (y) is a sequential numbering.

Examples

Guideline 5/2

Guideline

related to: Annex I Section 2.11.2, Annex I, Section 2.12

Question: In respect of pressure limiting devices, does the PED require that the per-

mitted short duration pressure surge of 1,1 PS be maintained when the

equipment is exposed to external fire conditions?

Answer: The 1,1 PS restriction does not apply to fire.

Reasons: The requirement in Annex I section 2.12 for external fire refers to dam-

age limitation, and does not serve the purpose of pressure limiting de-

vice in normal operation.

Accepted by WPG on: 2000-05-05

Accepted by Working Group "pressure" on: 2000-06-29

Guideline 6/3

Guideline

related to: Annex I Section 3.1.1, Annex I, Section 3.1.2

Question: How to interpret point 3.1.1 of Annex I as far as the forming procedures

are concerned? Does it impose for the manufacturer a qualification procedure for forming operations which will be validated by the Notified Body?

Answer: The Directive does not require for qualification of forming procedures in

point 3.1.1 of Annex I, although it includes such a qualification for per-

manent joints in point 3.1.2 of Annex I.

But there is an essential requirement about the preparation of the component parts (cf Annex I, point 3.1.1) and the manufacturer shall demonstrate in the technical documentation of the equipment that this re-

quirement has been satisfied.

Depending on the modules, the Notified Body may examine this techni-

cal documentation.

Accepted by WPG on: 1998-10-13

Accepted by Working Group "pressure" on: 1999-01-28

Annex 3 Guidelines related to the application of the Pressure Equipment Directive 97/23/EC

Guideline 6/5

Guideline

related to: Annex I Section 3.1.2, Annex I Section 3.1.3

Question: Do the requirements related to permanent joints given in Annex I, points

3.1.2 and 3.1.3 apply also to permanent joints other than welding?

Answer: Yes

Reason: The definition in article 1 paragraph 2.8 also covers other permanent

joints such as brazing, braze welding, expansion, gluing, frettage, riveting,... For that reason, the requirements of 3.1.2 and 3.1.3 apply also

for these types of joints.

Accepted by WPG on: 1999-06-10

Accepted by Working Group "pressure" on: 1999-11-08

Guideline 7/1

Guideline

related to: Annex I Section 4.2 b

Question: What is to be understood by harmonised standard as referred to in An-

nex I, section 4.2 b?

Answer: A harmonized standard in this context can be a harmonized product

standard for an item of pressure equipment or an assembly which may be CE marked. It could also be a harmonized supporting standard for materials, that contains technical data clearly indicating the field of ap-

plication.

The term could also refer to a harmonized standard in which the precise scope of application is not specified. In this case, the harmonized stand-

ard does not give rise to a presumption of conformity.

Accepted by WPG on: 1998-10-12

Accepted by Working Group "pressure" on: 2000-03-24

Note: Reservation on the part of Denmark

Guideline 8/2

Guideline

related to: Annex I Section 3.2.2, Annex I Section 7.4

Question: Final assessment (Annex I, section 3.2.2) of pressure equipment must

include a test for pressure containment at a pressure at least equal, where appropriate, to the value laid down in section 7.4. This section only refers to pressure vessels. Does this mean that 7.4 does not apply

to piping, and pressure and safety accessories?

Answer: In accordance with Annex I, 3.2.2 in the course of the final assessment

pressure equipment must be subjected to a test for the pressure containment aspect. As a rule, this test for the pressure containment aspect is supposed to be carried out in the form of a hydrostatic pressure test. Where this is not possible or disadvantageous other procedures are per-

missible.

The pressure value chosen for carrying out a hydrostatic pressure test must be such as to assure testing the pressure containment aspect of the pressure equipment with due consideration of the determined safety factors without causing a damage to the pressure equipment. Annex I, 7.4 provides additional formulas which may be applied only in due consideration of the above described general criteria (3.2.2). The formulas in Annex I, section 7.4 should be considered for all items of pressure equipment, not only pressure vessels.

Accepted by WPG on: 1999-07-16

Accepted by Working Group "pressure" on: 1999-11-08

Annex 3 Guidelines related to the application of the Pressure Equipment Directive 97/23/EC

Guideline 8/6

Guideline

related to: Annex I section 7

Question: The first paragraph Annex I section 7 explicitly provides for exceptions to

the general rules specified subsequently. How should the achievement of "an equivalent overall level of safety" in such a case be demonstrated?

Answer: The specific quantitative requirements given in section 7 of Annex I are

related to particular failure modes. If different values are used, the corresponding failure modes and their combination shall be identified and the measures taken to maintain an equivalent level of safety shall be provided in the technical documentation, with appropriate justifications.

The achievement of "an equivalent overall level of safety" may be assumed if the measures taken provide adequate safety margins against all relevant failure modes in a consistent manner. Safety margins are adequate, and deviation from a particular value is justified:

- a) by a reduced risk in the respective failure mode, or
- b) by additional means to ensure no increase of the risk.

When using a harmonised standard for pressure equipment which has been published in the Official Journal of the European Communities, no further justification is needed for the quantitative values which have been used as regard Annex I section 7 (refer also to guideline 7/1).

Accepted by WPG on: 2000-10-02

Accepted by Working Group "pressure" on: 2000-11-07

Guideline 9/5

Guideline

related to: Article 5

Question: In which conditions is it possible to use a document other than a harmo-

nised standard (national standard, professional code or private technical document) for the design and manufacture of pressure equipment for the

application of PED?

Answer: 1) The use of the harmonised standard is not mandatory.

2) However, the directive did not include provisions to give presumption

of conformity to documents other than harmonised standards.

A manufacturer using another document shall describe in his technical documentation the solutions adopted to meet the essential requirements of the directive.

The notified body (or the user inspectorate) shall validate, if required by the module chosen, these solutions.

3) The technical requirements of the Directive are given in Annex I. When using a national standard, a professional code or a private technical document for fulfilling Annex I, only the technical content of this document is relevant. Further provisions of this document (e.g. about bodies or certification procedures) are not relevant for the application of PFD

Note: See also guideline 9/6

Accepted by WPG on: 1999-07-15

Accepted by Working Group "pressure" on: 1999-11-08

Annex 3 Guidelines related to the application of the Pressure Equipment Directive 97/23/EC

Guideline 9/6

Guideline

related to: Article 5

Question: Is it possible to use partially one or more harmonised standards, codes

or specifications to design and manufacture a pressure equipment con-

form to the Pressure Equipment Directive?

Answer: The different parts (design, manufacture, inspection, ...) of an harmo-

nised standard, a code or a specification for pressure equipment form a

consistent set of documents which should be followed.

Nevertheless, the partial use of an harmonised standard, a code or a

specification is not forbidden.

In these conditions, the essential requirements covered by the part(s) of harmonised standards, codes or specifications used shall be identified.

The essential requirements not covered by the part(s) of harmonised standards, codes or specifications shall be subject to an analysis to

judge the validity of the adopted solutions.

Then, if several different parts of harmonised standards, codes or specifications are used, it shall be verified that there are no incompatibility or inconsistency between these parts, particularly for the application data

(permissible stress, safety coefficient, extent of the inspection, ...).

Note: See also auideline 9/5

Accepted by WPG on: 1999-06-10

Accepted by Working Group "pressure" on: 1999-11-08

Annex 4 Index of standard projects

Annexes 4/1 - 4/9 contain the current indexes of the standardization projects (as of 29 June 2001) pursuant to Directive 97/23/EC for the CEN/TCs responsible for standards governing plant and plant components and for one selected CEN/TC for product standardization.

CEN/TCs for standards governing plant and plant components	Annex	Page
54 Unfired pressure vessels 69 Industrial valves 74 Flanges and their joints 210 GRP tanks and vessels 267 Industrial piping and pipelines 268 Cryogenic vessels 269 Shell and water-tube boilers 286 Liquefied petroleum gas equipment and accessories	4/1 4/2 4/3 4/4 4/5 4/6 4/7 4/8	102 104 109 113 114 115 118 122
CEN/TC for product standardization	Annex	Page
182 Refrigeration systems, safety and environmental requirements	4/9	123

Standards pursuant to Directive 97/23/EC which have already been ratified are listed, where such standards exist.

Legend for the stage code in the table below

- 11 CEN/BT agreement to the working programme
- 31 Generation of a draft standard in the TC (SC/WG)
- 32 Distribution of 1st draft standard to members of the TC
- 40 Draft in three CEN languages from TC to CMC for enquiry
- 41 CEN enquiry
- 49 Final draft available for formal voting
- 51 Formal voting
- 53 Ratification of the EN by CEN/BT
- 63 Creation of the final three language versions
- 64 EN available
- 73 National transposition of the EN

Annex 4/1 CEN/TC 54 - Unfired pressure vessels

Description WI/Registration number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
prEN 13445-1 0005407	Unfired pressure vessels - Part 1: General	41	×	×		
prEN 13445-2 00054012	Unfired pressure vessels - Part 2: Materials	41	×	×		
prEN 13445-3 00054013	Unfired pressure vessels - Part 3: Design	41	×	×		
prEN 13445-4 00054014	Unfired pressure vessels - Part 4: Manufacture	41	×	X		
prEN 13445-5 00054015	Unfired pressure vessels - Part 5: Inspection and testing	41	×	X		
prEN 13445-6 00054018	Unfired pressure vessels - Part 6: Additional requirements for design and fabrication of pressure vessels and vessel parts constructed of spheroidal graphite cast iron	41	×	×		
prEN 13445-6/ prA1 ²⁾ 00054027	Unfired pressure vessels - Part 6: Additional requirements for design and fabrication of pressure vessels and vessel parts constructed of spheroidal graphite cast iron	41	×	×		
prCR 13445-7 ³⁾ 00054030	Unfired pressure vessel - Part 7: Guidance on the use of the conformity procedures	11				
prEN 764-1 00054023	Pressure equipment: Terminology - Part 1: Pressure, temperature, volume, nominal size	32	×			X

¹ These also include horizontal and basic EN standards, in addition to supporting EN standards.

A topic for a normative Annex A, "Assessment of fatigue life" for the analysis with respect to alternating stress, was included under the designation prEN 13445-6/prA1 as a supplement to standard section 13445-6/. A dedicated CEN enquiry has already been launched for this Annex A, which is intended for timely integration into EN 13445-6.

³ Document with the status of a CEN Report.

Description WI/Registration number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
prEN 764-2 00054020	Pressure equipment: Terminology - Part 2: Quantities, symbols and units	49	\boxtimes			×
prEN 764-3 00054021	Pressure equipment: Terminology - Part 3: Definition and parties involved	49	×			×
prEN 764-4 00054023	Pressure equipment — Part 4: Establishment of technical delivery conditions for materials	49	×			X
prEN 764-5 00054025	Pressure equipment - Part 5: Compliance and inspections documentation of materials	49	×		X	
prEN 764-6 00054024	Pressure equipment - Part 6: Operating instructions	49	×			×
prEN 764-7 00054016	Pressure equipment - Part 7: Safety systems for unfired pressure vessels	49	×		X	
prEN 13831 00054010	Closed expansion vessels with built in diaphragm for installations in water systems	41	×	X		
00054019	Gas-loaded accumulators for fluid power applications	32	×	X		
00054028	Aluminium pressure vessels	11	×	×		

Annex 4/2 CEN/TC 69 – Industrial valves

Description WI/Registra- tion number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
prEN ISO 4126-1 00069026	Safety devices for protection against excessive pressure - Part 1: Safety valves	49	×	X		
prEN ISO 4126-2 00069027	Safety devices for protection against excessive pressure - Part 2: Bursting disc safety devices	43	×	X		
prEN ISO 4126-3 00069066	Safety devices for protection against excessive pressure - Part 3: Safety valves and bursting disc safety devices in combination	32	X	X		
prEN ISO 4126-4 00069067	Safety devices for protection against excessive pressure - Part 4: Pilot operated safety valves	41	×	X		
ISO/CD 4126-5 00069068	Safety devices for protection against excessive pressure - Part 5: Controlled safety pressure relief systems (CSPRS) – General requirements	11	×	×		
prEN ISO 4126-6 00069081	Safety devices for protection against excessive pressure - Part 6: Application, selection and installa- tion of bursting disc safety devices	41	X	X		
prEN ISO 4126-7 00069069	Safety devices for protection against excessive pressure - Part 7: Common data	41	×	X		
prEN ISO 21787 00069073	Industrial valves - Globe valve of thermoplastic materials	40	×	X		
prEN 13341 00069043	Steel check valves	11	×	X		
00069094	Industrial valves — Actuators — Part 1: Terminology and definitions of actuators for industrial valves	11	×			×

¹ These also include horizontal and basic EN standards, in addition to supporting EN standards.

Description WI/Registration number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
00069095	Industrial valves — Actuators — Part 2: Electric actuators for indus- trial valves — Basic requirements	11				×
00069096	Industrial valves — Actuators — Part 3: Pneumatic part-turn actua- tors for industrial valves — Basic requirements	11	×			X
00069097	Industrial valves — Actuators — Part 4: Hydraulic part-turn actua- tors for industrial valves — Basic requirements	11	×			×
prEN 19 rev 00069076	Industrial valves – Part 103: Marking of metallic valves	49	⊠		×	
prEN 593:1998 rev 00069091	Industrial valves – Metallic butterfly valves	11	×	X		
EN 736:1999/prA1 00069090	Valves - Terminology - Part 3: Definition of terms	51	×			×
prEN 1171 00069040	Cast iron gate valves	43	\boxtimes	X		
prEN 1503-4 00069060	Valves - Materials for bodies, bonnets and covers - Part 4: Copper alloys specified in Euro- pean Standards	49	×			×
prEN 1983 00069061	Industrial steel ball valves	43	☒	X		
prEN ISO 10497 00069002	Testing of valves; fire type-testing requirements	32	\boxtimes		×	
prEN 12266-1 000690217	Industrial valves - Testing of valves Part 1: Tests, test procedures and acceptance criteria to be fulfilled by every valve	43	×		×	

¹ These also include horizontal and basic EN standards, in addition to supporting EN standards.

Description WI/Registra- tion number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
prEN 12266-2 00069084	Industrial valves – Testing of valves Part 2: Supplementary tests, test procedures and acceptance criteria	43	×			×
prEN 12288 00069050	Industrial valves – Copper alloy gate valves	49	×	X		
prEN 12328 00069051	Industrial valves – Copper alloy check valves	49	×	X		
prEN 12360 00069046	Industrial valves – Copper alloy globe valves	49	×	×		
prEN 12516-1 00069082	Industrial valves - Shell design strength - Part 1: Tabulation method for steel valve shells	41	×		X	
prEN 12516-2 00069083	Industrial valves - Shell design strength - Part 2: Calculation method for steel valve shells	41	×		X	
prEN 12516-3 00069082	Valves - Shell design strength - Part 3: Experimental method	49	\boxtimes		X	
prEN 13397 00069023	Industrial valves – Diaphragm valves made of metallic materials	49	×	X		
prEN 13547 00069062	Industrial valves – Copper alloy ball valves	41	×	X		
prEN 13709 00069044	Industrial valves - Steel globe and globe stop and check valves	41	\boxtimes	X		
prEN 13774 00069048	Valves for gas distribution systems with maximum operating ≤ 16 bar – Performance requirements	41	×			×
prEN 13789 00069045	Industrial valves - Cast iron globe valves	41	×	×		

 $^{^{\}rm 1}$ These also include horizontal and basic EN standards, in addition to supporting EN standards.

Description WI/Registra- tion number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
prEN ISO 16135 00069070	Industrial valves - Ball valve of thermoplastic materials	40	×	X		
prEN ISO 16136 00069072	Industrial valves — Butterfly valves of thermoplastic materials	40	×	X		
prEN ISO 16137 00069074	Industrial valves – Check valves of thermoplastic materials	40	×	X		
prEN ISO 16138 00069071	Industrial valves – Diaphragm valves of thermoplastic materials	40	×	X		
prEN ISO 16139 00069089	Industrial valves - Gate valves for thermoplastic materials	41	×	×		

¹ These also include horizontal and basic EN standards, in addition to supporting EN standards.

Note:

The following mandated standardization projects, which are still listed in the CEN project file (as of 28 May 2001), have already been completed and are therefore no longer included in the above index of current standardization projects.

Harmonized EN/candidate standards

The following harmonized EN and candidate standards were created on the basis of a mandate pursuant to Directive 97/23/EC. Whether the references have been published in the Official Journal of the European Communities is indicated.

Number	Title	Harmonized EN support- ing EN		Reference published
DIN EN 1984 2000-03	Industrial valves - Steel gate valves	×		×
EN 1349:2000	Industrial process control valves	×		
DIN EN 12334 2001-01	Industrial valves - Cast iron check valves	×		

Annex 4/2 CEN/TC 69 – Industrial valves

Supporting EN (not harmonized)

DIN EN 19 1977-09	Marking of general purpose industrial valves
DIN EN 558-1 1995-12	Industrial valves – Face-to-face and centre-to-face dimensions of metal valves for use in flanged pipe systems – Part 1: PN-designated valves
DIN EN 558-2 1995-12	Industrial valves – Face-to-face and centre-to-face dimensions of metal valves for use in flanged pipe systems – Part 2: Class-designated valves
DIN EN 736-1 1995-04	Valves – Terminology – Part 1: Definition of types of valves
DIN EN 736-2 1997-11	Valves – Terminology – Part 2: Definition of components of valves
DIN EN 736-3 1999-08	Valves – Terminology – Part 3: Definition of terms
DIN EN 1267 1999-11	Valves – Test of flow resistance using water as test fluid
EN 1503-1:2000	Valves – Materials for bodies, bonnets and covers – Part 1: steels specified in European Standards
EN 1503-2:2000	Valves – Materials for bodies, bonnets and covers – Part 2: steels other than those specified in European Standards
EN 1503-3:2000	Valves – Materials for bodies, bonnets and covers – Part 3: cast iron specified in European Standards
DIN EN 12627 1999-10	Industrial valves – Butt welding ends for steel valves
DIN EN 12760 1999-12	Valves – Socket welding ends for steel valves
DIN EN 12982 2000-03	Industrial valves — End-to-end and centre-to-end dimensions for butt welding end valves
DIN EN 26704 1991-11	Automatic steam traps; classification (ISO 6704:1982)
DIN EN 26948 1991-11	Automatic steam traps; production and performance characteristic tests (ISO 6948:1981);
DIN EN ISO 5211 2001-02	Industrial valves – Part-turn valve actuator attachments (ISO 5211:2001)

Annex 4/3 CEN/TC 74 – Flanges and their joints

Description WI/Registra- tion number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
prEN 1514-6 00074036	Flanges and their joints – Dimensions of gaskets for PN-designated flanges – Part 6: Covered serrated metal gaskets for use with steel flanges	11	×			X
prEN 12560-6 00074037	Flanges and their joints – Gaskets for class-designated flanges – Part 6: Covered serrated metal gaskets for use with steel flanges	11	×			X
00074018	Flanges and their joints – Determina- tion of the calculation method for P/T ratings	32	×			X
00074031	Flanges and their joints – Quality assurance standards for individual gasket types for industrial applications	11	×			X
00074034	Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories – Class-designated – Flanges with bore sizes DN 650 to DN 1500	11	×		×	
prEN 1514-2: 1997 rev 00074042 ²⁾	Flanges and their joints – Dimensions of gaskets for PN-designated flanges – Part 2: Spiral wound gaskets for use with steel flanges	11				X
000740432)	Class designated gaskets for metric bolts, screws and nuts	11				×
00074046 ²⁾	Sealing rings for flanges PN designated	11				×
00074047	Combination of flange and bolting materials for steel flanges – Class- designated	11	X		X	

 $^{^{\}rm l}$ These also include horizontal and basic EN standards, in addition to supporting EN standards. $^{\rm 2}$ Mandating as supporting standard envisaged.

Annex 4/3 CEN/TC 74 – Flanges and their joints

Description WI/Registra- tion number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
prEN 12560-7 00074039	Flanges and their joints – Dimension of gaskets for Class designated flang- es – Part 7: Covered metal jacketed gaskets for use with steel flanges	11	×			×
prEN 1514-7 00074038	Flanges and their joints – Dimensions of gaskets for PN-designated flanges – Part 7: Covered metal jacketed gaskets for use with steel flanges	11	×			×
prEN 1092-1 00074005	Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN designated – Part 1: Steel flanges	51	×		×	
prEN 1092-1 rev 00074044	Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN designated – Part 1: Steel flanges	11	×		×	
prEN 1092-2: 1997 rev 00074045	Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN designated – Part 2: cast iron flanges	11	×		×	
prEN 1092-4 00074011	Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN designated – Part 4: Aluminium alloy flanges	49	×		×	
prEN 1515-2 00074029	Flanges and their joints – Bolting – Part 2: Classification of bolt materials for steel flanges, PN designated	49	×		×	
prENV 1591-2 00074041	Flanges and their joints – Design rules for gasketed circular flange connec- tions – Part 2: Gasket parameters	51	×		×	

 $^{^{\}rm 1}$ These also include horizontal and basic EN standards, in addition to supporting EN standards.

Description WI/Registration number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
prEN 1759-1 00074006	Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, class designated – Part 1: Steel flanges, NPS 1/2 to 24	41	X		X	
prEN 1759-4 00074033	Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, class designated — Part 4: Aluminium alloy flanges	41	X		X	
prEN 12560-1: 2001-04 00074023	Flanges and their joints – Gaskets for Class-designated flanges – Part 1: Non-metallic flat gaskets with or without inserts	63	X			X
prEN 12560-2: 2001-04 00074024	Flanges and their joints – Gaskets for Class-designated flanges – Part 2: Spiral wound gaskets for use with steel flanges	63	X			X
prEN 12560-3: 2001-04 00074025	Flanges and their joints – Gaskets for Class-designated flanges – Part 3: Non-metallic PTFE envelope gaskets	63	X			X
prEN 12560-4: 2001-04 00074026	Flanges and their joints – Gaskets for Class-designated flanges – Part 4: Corrugated, flat or grooved metallic and filled metallic gaskets for use with steel flanges	63	×			×
prEN 12560-5: 2001-04 00074027	Flanges and their joints – Gaskets for Class-designated flanges – Part 5: Metallic ring joint gaskets for use with steel flanges	53	×			X
prEN 13555 00074032	Flanges and their joints – Gasket parameters and test procedures rele- vant to the design rules for gasketed circular flange connections	41	×			×

¹ These also include horizontal and basic EN standards, in addition to supporting EN standards.

Annex 4/3 CEN/TC 74 – Flanges and their joints

Note:

The following mandated standardization projects, which are still listed in the CEN project file (as of 28 May 2001), have already been completed and are therefore no longer included in the above index of current standardization projects.

Harmonized EN/candidate standards

The following candidate standard for a harmonized supporting EN was created on the basis of a mandate pursuant to Directive 97/23/EC.

Number	Title	Harmonized EN support- ing EN		Reference published
DIN EN 1591 1994-11	Flanges and their joints – Design rules for gasketed circular flange connections – Part 1: Calculation method; German version EN 1591-1:2001		X	

Supporting EN (not harmonized)

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DIN EN 1333 1996-10	Pipework components - Definition and selection of PN
DIN EN 1514-1 1997-08	Flanges and their joints - Dimensions of gaskets for PN-designated flanges — Part 1: Non-metallic flat gaskets with or without inserts
DIN EN 1514-2 1997-08	Flanges and their joints - Dimensions of gaskets for PN-designated flanges – Part 2: Spiral wound gaskets for use with steel flanges
DIN EN 1514-3 1997-08	Flanges and their joints - Dimensions of gaskets for PN-designated flanges — Part 3: Non-metallic PTFE envelope gaskets
DIN EN 1514-4 1997-08	Flanges and their joints - Dimensions of gaskets for PN-designated flanges – Part 4: Corrugated flat or grooved metallic and filled metallic gaskets for use with steel flanges
DIN EN 1515-1 2000-01	Flanges and their joints - Bolting - Part 1: Selection of bolting
DIN EN ISO 6708 1995-09	Pipework components - Definition and selection of DN (nominal size) (ISO 6708:1995)

Annex 4/4 CEN/TC 210 – GRP tanks and vessels

Description WI/Registra- tion number	Title	Stage code	Man- date	Harmo EN	nized support- ing EN	Sup- port- ing EN ¹⁾
prEN 13121-1 00210006	GRP tanks and vessels for use above ground – Part 1: Raw materials – Acceptance conditions and usage conditions	49	X	×		
prEN 13121-2 00210007	GRP tanks and vessels for use above ground - Part 2: Composite materials – Chemical resistance	41	×	X		
prEN 13121-3 00210008	GRP tanks and vessels for use above ground - Part 3: Design and workmanship	41	×	X		
prEN 13121-4 00210009	GRP tanks and vessels for use above ground - Part 4: Delivery, installation and maintenance	41	×	X		
prEN 13923 00210013	Filament wound FRP pressure vessels – Materials, design, calculation, manufacturing and testing	41	×	X		

¹ These also include horizontal and basic EN standards, in addition to supporting EN standards.

Annex 4/5 CEN/TC 267 – Industrial piping and pipelines

Description WI/Registra- tion number	Title	Stage code	Man- date	Harmo EN	nized support- ing EN	Sup- port- ing EN ¹⁾
prEN 13480-1	Metallic industrial piping — Part 1:General	41	×	×		
prEN 13480-2	Metallic industrial piping – Part 2: Materials	41	X	×		
prEN 13480-3	Metallic industrial piping — Part 3: Design and calculation	41	×	×		
prEN 13480-4	Metallic industrial piping — Part 4: Fabrication and installation	41	X	×		
prEN 13480-5	Metallic industrial piping – Part 5: Inspection and testing	41	×	×		
prEN 13480-6	Metallic industrial piping – Part 6: Safety systems	32				
prCR 13480-72	nicht gefunden					

These also include horizontal and basic EN standards, in addition to supporting EN standards.
 Document with the status of a CEN Report. The definite German title has not been specified yet.

Annex 4/6 CEN/TC 268 – Cryogenic vessels

Description WI/Registration number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
00268005	Cryogenic vessels — Static non-vacuum insulated vessels — Part 1: Fundamental requirements	40	×	X		
00268028	Cryogenic vessels — Static non-vacuum insulated vessels — Part 2: Design, fabrication, inspection and testing	40	×	X		
00268029	Cryogenic vessels — Static non-vacuum insulated vessels — Part 3: Operational requirements		×	X		
prEN 1797 00268042	Cryogenic vessels – Gas/material compatibility	51	×		×	
prEN 13371 00268037	Cryogenic vessels – Couplings for cryogenic service	49	×	×		
prEN 13458-1 00268006	Cryogenic vessels -static vacuum- insulated vessels – Part 1: Funda- mental requirements	49	×	X		
prEN 13458-2 00268031	Cryogenic vessels – static vacuum- insulated vessels – Part 2: Design, fabrication, inspection and testing	49	×	X		
prEN 13458-3 00268032	Cryogenic vessels – static vacuum- insulated vessels – Part 3: Operational requirements	49	×			
prEN 13648-1 00268039	Cryogenic vessels – Safety devices for protection against excessive pressure – Part 1: Safety valves for cryogenic service	49	×	X		

 $^{^{\}rm 1}$ These also include horizontal and basic EN standards, in addition to supporting EN standards.

Annex 4/6 CEN/TC 268 – Cryogenic vessels

Description WI/Registration number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
prEN 13648-2 00268040	Cryogenic vessels – Safety devices for protection against excessive pressure – Part 2: Bursting disc safety devices for cryogenic vessels		X	×		
prEN 13648-3 00268041	Cryogenic vessels – Safety devices for protection against excessive pressure – Part 3: Determination of required discharge; Capacity and sizing		\boxtimes	X		

¹ These also include horizontal and basic EN standards, in addition to supporting EN standards.

Note:

The following mandated standardization projects, which are still listed in the CEN project file (as of 28 May 2001), have already been completed and are therefore no longer included in the above index of current standardization projects.

Harmonized EN and harmonized supporting EN/candidate standards

The following harmonized EN, harmonized supporting EN and candidate standards were created on the basis of a mandate pursuant to Directive 97/23/EC. Whether the references have been published in the Official Journal of the European Communities is indicated.

Number	Title	Harmonized EN support- ing EN		Reference published
EN 1252-1:1998	Cryogenic vessels. Materials. Part 1: toughness requirements for temperatures below minus 80 degrees Celsius.		×	X
EN 1252-2:2001	Cryogenic vessels – Materials – Part 2: toughness requirements for temperatures between -80 °C and -20 °C.		×	
EN 1626:1999	Cryogenic vessels. Valves for cryogenic service	X		X
EN 1797-1:1998	Cryogenic vessels. Gas/material compatibility. Part 1: oxygen compatibility		×	
EN 12300:1998	Cryogenic vessels. Cleanliness for cryogenic service		×	X

Supporting EN (not harmonized)

EN 12213:1998 Cryogenic vessels - Methods for performance evaluation of thermal insulatio	on
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Annex 4/7 CEN/TC 269 - Shell and water-tube boilers

Description WI/Registration number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
prEN 12952-1 00269002	Water-tube boilers and auxiliary installations – Part 1: General	53	×	X		
prEN 12952-2 00269013	Water-tube boilers and auxiliary instal- lations – Part 2: Materials for pressure parts of boilers and accessories	53	×		X	
prEN 12952-3 00269014	Water tube boilers and auxiliary installations – Part 3: Design and calculation for pressure parts	51	×	X		
prEN 12952-4 : 2000-02 00269015	Water tube boilers and auxiliary installations – Part 4: In-service boiler life expectancy calculations	63	×			X
prEN 12952-5 00269016	Water-tube boilers and auxiliary installations – Part 5: Workmanship and construction of pressure parts of the boiler	53	×	X		
prEN 12952-6 00269037	Water tube boilers – Part 6: Inspection during construction, documentation and marking	49	×	X		
prEN 12952-7 00269017	Water tube boilers and auxiliary installations — Part 7: Requirements for equipment	49	×	×		
prEN 12952-8 00269018	Water-tube boilers – Part 8: Requirements for firing systems for liquid and gaseous fuels	41	×	X		
prEN 12952-9 00269029	Water-tube boilers and auxiliary installations – Part 9: Requirements for firing systems for pulverized solid fuel for the boiler	41	×	X		

 $^{^{\}rm l}$ These also include horizontal and basic EN standards, in addition to supporting EN standards.

Description WI/Registration number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
prEN 12952-10 00269020	Water tube boilers and auxiliary installations – Part 10: Requirements for safeguards against excessive pressure	41	×	×		
prEN 12952-11 00269021	Water-tube boilers and auxiliary installations – Part 11: Requirements for limiting devices and safety circuits of the boiler and accessories	41	X	×		
prEN 12952-12 00269022	Water tube boilers and auxiliary installations – Part 12: Requirements for feedwater and boiler water quality	41	×	X		
prEN 12952-13 00269023	Water tube boilers – Part 13: Requirements for flue gas cleaning systems	41	×			×
prEN 12952-14 00269024	Water-tube boilers and auxiliary installations – Part 14: Requirements for flue gas DENOX-systems	41	×	X		
prEN 12952-15 00269026	Water-tube boilers and auxiliary installations — Part 15: Acceptance tests	41	×			×
prEN 12952-16 00269030	Water-tube boilers and auxiliary installations – Part 16: Requirements for fluidized bed and grate firing systems for solid fuels for the boiler	41	×	×		
prCR 12952-17 ²⁾ 00269038	Water-tube boilers and auxiliary installations – Part 17: Guideline for the involvement of an inspection body independent of the manu- facturer	11				

 $^{^{1}}$ These also include horizontal and basic EN standards, in addition to supporting EN standards. 2 Document with the status of a CEN Report. The definite German title has not been specified yet.

Annex 4/7 CEN/TC 269 - Shell and water-tube boilers

Description WI/Registra- tion number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
prEN 12953-1 00269003	Shell boilers – Part 1: General	49	×	×		
prEN 12953-2 00269004	Shell boilers – Part 2: Materials for pressure parts of boilers and accessories	49	×	X		
prEN 12953-3 00269005	Shell boilers – Part 3: Design and calculation for pressure parts	49	×	X		
prEN 12953-3/ prA1 00269033	Shell boilers – Part 3: Design and calculation for pressure parts; amendment A1	34		X		
prEN 12953-4 00269006	Shell boilers – Part 4: Workmanship and construction	49	×	X		
prEN 12953-5 00269035	Shell boilers – Part 5: Inspection during construction, documentation and marking	41	×	X		
prEN 12953-6 00269007	Shell boilers – Part 6: Requirements for equipment	49	×	X		
prEN 12953-7 00269008	Shell boilers – Part 7: Requirements for firing systems for liquid and gaseous fuels	49	×	X		
prEN 12953-8 00269009	Shell boilers – Part 8: Requirements for safeguards against excessive pressure	49	×	X		
prEN 12953-9 00269010	Shell boilers – Part 9: Requirements for limiting devices and safety circuits of the boiler and accessories	41	×	X		
prEN 12953-10 00269011	Shell boilers – Part 10: Requirements for feedwater and boiler water quality	41	×	X		

¹ These also include horizontal and basic EN standards, in addition to supporting EN standards.

Description WI/Registration number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
prEN 12953-11 00269027	Shell boilers – Part 11: Acceptance tests	41	X			×
prEN 12953-12 00269028	Shell boilers – Part 12: Requirements for grate firing systems for solid fuels for the boiler		×	X		
prEN 12953-13 00269034	Shell boilers – Part 13: Operating instructions	11	×	×		
prCR 12953-14 00269036 ²⁾	Shell boilers – Part 14: Guideline for the involvement of an inspection body independent of the manufac- turer	11				
prEN 14222 00269031	Stainless steel shell boilers	40	×	X		

¹ These also include horizontal and basic EN standards, in addition to supporting EN standards. ² Document with the status of a CEN Report. The definite German title has not been specified yet.

Annex 4/8 CEN/TC 286 – Liquefied petroleum gas equipment and accessories

Description WI/Registration number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
00286054	Equipping of LPG tanks, overground and underground	32	×	X		
00286051	Construction and performance of LPG equipment and components for automotive LPG fitting stations – Part 1: Equipment	32	X	X		
prEN 12542 00286004	Static welded steel cylindrical tanks, serially produced for the storage of Liquified Petroleum Gas (LPG) having a volume not greater than 13 m³ and for installation above ground – Design and manufacture	49	×	×		
prEN 12805 00286029	Automotive LPG components – Containers	41	×	X		
prEN 13175 00286011	Specification and testing for Lique- fied Petroleum Gas (LPG) tank valves	41	×	X		
prEN 13799 00286013	Contents gauges for LPG tanks	41	×	X		
prEN 14071 00286046	Pressure relief valves for LPG tanks – Ancillary equipment	41	×	X		
prEN 14075 00286005	Static welded steel cylindrical tanks, serially produced for the storage of Liquefied Petroleum Gas (LPG) having a volume not greater than 13 m ³ and for installation underground – Design and manufacture	41	X	×		
prEN 14129 00286045	Pressure relief valves for LPG tanks	41	X	X		

¹ These also include horizontal and basic EN standards, in addition to supporting EN standards.

Annex 4/9 CEN/TC 182 – Refrigerating systems, safety and environmental requirements

Description WI/Registration number	Title	Stage code	Man- date	Harmo EN	onized support- ing EN	Sup- port- ing EN ¹⁾
prEN 14276-1 00182025	Pressure equipment for refrigerating systems and heat pumps – Part 1: Vessels – General requirements	40	×	X		
prEN 14276-2 00182028	Pressure equipment for refrigerating systems and heat pumps – Part 2: Piping	11	×	X		
prEN 12178 00182016	Refrigerating systems and heat pumps – Liquid level indicating devices – Requirements, testing and marking	41	×		X	
prEN 12284 00182014	Refrigerating systems and heat pumps – Valves – Requirements, testing and marking	49	×		×	
prEN 12693 00182023	Refrigerating systems and heat pumps – Safety and environmental requirements – Refrigerant compres- sors	49	X	X		
prEN 13136 00182027	Refrigerating systems and heat pumps – Pressure relief devices and their associated piping – Methods for calculation	53	×	X		

¹ These also include horizontal and basic EN standards, in addition to supporting EN standards.

Annex 4/9 CEN/TC 182 – Refrigerating systems, safety and environmental requirements

Note 1:

The following mandated standardization projects, which are still listed in the CEN project file (as of 28 May 2001), have already been completed and are therefore no longer included in the above index of current standardization projects.

Harmonized EN and harmonized supporting EN/candidate standards

The following harmonized EN, harmonized supporting EN and candidate standards were created on the basis of a mandate pursuant to Directive 97/23/EC. Whether the references have been published in the Official Journal of the European Communities is indicated.

Number	Title	Harmo EN	onized support- ing EN	Reference published
DIN EN 378-1	Refrigerating systems and heat pumps – Safety and environmental requirements – Part 1: Basic requirements, definitions, classification and selection criteria	X		X
DIN EN 378-2	Refrigerating systems and heat pumps — Safety and environmental requirements — Part 2: Design, construction, testing, marking and documentation	X		X
DIN EN 378-3	Refrigerating systems and heat pumps – Safety and environmental requirements – Part 3: Installation site and personal protection	X		X
DIN EN 378-4	Refrigerating systems and heat pumps – Safety and environmental requirements – Part 4: Operation, maintenance, repair and recovery	X		X
DIN EN 12263	Refrigerating systems and heat pumps – Safety switching devices for limiting the pressure – Requirements and tests		×	×

Supporting EN (not harmonized)

DIN EN 1861 1998-07	Refrigerating systems and heat pumps - System flow diagrams and piping and instrument diagrams - Layout and symbols
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Note 2:

The following EN was not created on the basis of a mandate pursuant to Directive 97/23/EC.

prEN 13313	Refrigerating systems and heat pumps - Competence of personnel
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Note 3:

The EN 378 series of standards is currently undergoing revision under a mandate pursuant to Directive 98/37/EC for machinery with regard to requirements for specific machines. The corresponding standards projects are maintained under the following registration numbers:

Description WI/Registration number	Title	Stage code	Mandate based on Directive 98/37/EC
prEN 378-1: 2000 rev 00182029	Refrigerating systems and heat pumps – Safety and environmental requirements – Part 1: Basic requirements, definitions, classification and selection criteria	11	×
prEN 378-2: 2000 rev 00182030	Refrigerating systems and heat pumps — Safety and environmental requirements — Part 2: Design, construction, testing, marking and documentation	11	×
prEN 378-3: 2000 rev 00182031	Refrigerating systems and heat pumps — Safety and environmental requirements — Part 3: Installation site and personal protection	11	X
prEN 378-4: 2000 rev 00182032	Refrigerating systems and heat pumps — Safety and environmental requirements — Part 4: Operation, maintenance, repair and recovery	11	×

Annex 5 Index of harmonized standards governing pressure equipment

Harmonized standards, the references of which have been published in the Official Journal of the European Communities (status 18 June 2001)

Standard No.	Description	Issue date	Published in OJ
DIN EN 378-1	Refrigerating systems and heat pumps – Safety and environmental requirements – Part 1: Basic requirements, definitions, classification and selection criteria	September 2000	C 202 18.07.01
DIN EN 378-2	Refrigerating systems and heat pumps – Safety and environmental requirements – Part 2: Design, construction, testing, marking and documentation	September 2000	C 348 05.12.00
DIN EN 378-3	Refrigerating systems and heat pumps – Safety and environmental requirements – Part 3: Installation site and personal protection; German version EN 378-3:2000	September 2000	C 348 05.12.00
DIN EN 378-4	Refrigerating systems and heat pumps – Safety and environmental requirements – Part 4: Operation, maintenance, repair and recovery	September 2000	C348 05.12.00
DIN EN 473	Non-destructive testing — Qualification and certification of NDT personnel — General principles; German version EN 473:2000	March 2001	C 202 18.07.01
DIN EN 583-1	Non-destructive testing – Ultrasonic examination – Part 1: General principles	December 1998	C 210 22.07.00
DIN EN 1252-1	Cryogenic vessels – Materials – Part 1: Toughness requirements for temperatures below – 80°C	May 1998	C 210 22.07.00
DIN EN 1252-1 Correction 1	Correction of DIN EN 1252-1: 1998-05 (EN 1252-1:1998/AC 1998)	April 1999	C 348 05.12.00
DIN EN 1289	Non-destructive examination of welds; Penetrant testing of welds; Acceptance levels	March 1998	C 348 05.12.00
DIN EN 1291	Non-destructive examination of welds; Magnetic particle testing of welds; Acceptance levels	March 1998	C 348 05.12.00
DIN EN 1593	Non-destructive testing; Leak testing; Bubble emission techniques	November 1999	C 210 22.07.00
DIN EN 1626	Cryogenic vessels; Valves for cryogenic service	May 1999	C 210 22.07.00

Standard No.	Description	Issue date	Published in OJ
DIN EN 1653 ¹⁾	Copper and copper alloys; Plate, sheet and circles for boilers, pressure vessels and hot water storage units; German version EN 1653:A1:2000	November 2000	C 202 18.07.01
DIN EN 1708-1	Welding — Basic weld joint details in steel — Part 1: Pressurized components	May 1999	C 227 10.08.99
DIN EN 1711	Non-destructive examination of welds; Eddy current examination of welds by complex plane analysis; German version EN 1711:2000	March 2000	C 202 18.07.01
DIN EN 1713	Non-destructive examination of weld; Ultrasonic examination; Characterization of indications in welds	August 1998	C 348 05.12.00
DIN EN 1779	Non-destructive testing; Leak testing; Criteria for the method and technique selection	October 1999	C 210 22.07.00
DIN EN 1982 ¹⁾	Copper and copper alloys; Ingots and castings	December 1998	C 348 05.12.00
DIN EN 1984	Industrial valves; Steel gate valves	March 2000	C 348 05.12.00
DIN EN 10028-11)	Flat products made of steel for pressure purposes – Part 1: General requirements; German version EN 10028-1:1992	April 1993	C 348 05.12.00
DIN EN 10028-2 ¹⁾	Flat products made from steel for pressure purposes – Part 2: Non-alloy and alloy steels with specified elevated temperature properties; German version EN 10028-2:1992	April 1993	C 348 05.12.00
DIN EN 10028-3 ¹⁾	Flat products made from steel for pressure purposes – Part 3: Weldable fine grain steels, normalized; Ger- man version EN 10028-3:1992	April 1993	C 348 05.12.00
DIN EN 10028-4 ¹⁾	Flat products made of steels for pressure purposes – Part 4: Nickel alloyed steels with specified low temperature properties	November 1994	C 348 05.12.00

Annex 5 Index of harmonized standards governing pressure equipment

Standard No.	Description	Issue date	Published in OJ
DIN EN 10028-5 ¹⁾	Flat products made of steels for pressure purposes – Part 5: Weldable fine grain steels, thermomechanically rolled; German version EN 10028-5:1996	February 1997	C 348 05.12.00
DIN EN 10028-6 ¹⁾	Flat products made of steels for pressure purposes – Part 6: Weldable fine grain steels, quenched and tempered; German version EN 10028-6:1996	February 1997	C 348 05.12.00
DIN EN 10028-7 ¹⁾	Flat products made of steels for pressure purposes – Part 7: Stainless steels	June 2000	C 348 05.12.00
DIN EN 10213-11)	Technical delivery conditions for steel castings for pressure purposes – Part 1: General; German version EN 10213-1:1995	January 1996	C 348 05.12.00
DIN EN 10213-2 ¹⁾	Technical delivery conditions for steel castings for pressure purposes – Part 2: Steel grades for use at room temperature and elevated temperatures; German version EN 10213-2:1995	January 1996	C 348 05.12.00
DIN EN 10213-3 ¹⁾	Technical delivery conditions for steel castings for pressure purposes — Part 3: Steel grades for use at low temperatures; German version EN 10213-3:1995	January 1996	C 348 05.12.00
DIN EN 10213-4 ¹⁾	Technical delivery conditions for steel castings for pressure purposes – Part 4: Austenitic and austenitic-ferritic steel grades; German version EN 10213-4:1995	January 1996	C 348 05.12.00
DIN EN 10222-11)	Steel forgings for pressure purposes – Part 1: General requirements for open die forgings	September 1998	C 348 05.12.00
DIN EN 10222-2 ¹⁾	Steel forgings for pressure purposes – Part 2: Ferritic and martensitic steels with specified elevated temperature properties (including corrigendum AC:2000); German version EN 10222-2:1999 + AC:2000	April 2000	C 348 05.12.00
DIN EN 10222-3 ¹⁾	Steel forgings for pressure purposes – Part 3: Nickel steels with specified low temperature properties; German version EN 10222-3:1998	February 1999	C 348 05.12.00

Standard No.	Description	Issue date	Published in OJ
DIN EN 10222-4 ¹⁾	Steel forgings for pressure purposes – Part 4: Weldable fine grain steels with high proof strength; German version EN 10222-4:1998	February 1999	C 348 05.12.00
DIN EN 10222-5 ¹⁾	Steel forgings for pressure purposes – Part 5: Martensitic, austenitic and austenitic-ferritic stainless steels; German version EN 10222-5:1999	February 2000	C 348 05.12.00
DIN EN 10269 ¹⁾	Steels and nickel alloys for fasteners with specified elevated and/or low temperature properties	November 1999	C 348 05.12.00
DIN EN 10272 ¹⁾	Stainless steel bars for pressure purposes; German version EN 10272:2000	January 2001	C 202 18.07.01
DIN EN 102731)	Hot rolled weldable steel bars for pressure purposes with specified elevated temperature properties	April 2000	C 202 18.07.01
DIN EN 12263	Refrigerating systems and heat pumps; Safety switching devices for limiting the pressure; Requirements and tests; German version EN 12263:1998	January 1999	C 210 22.07.00
DIN EN 12300	Cryogenic vessels – Cleanliness for cryogenic service; German version EN 12300:1998	February 1999	C 227 10.08.99
DIN EN 123921)	Aluminium and aluminium alloys – Wrought products; Special requirements for products intended for the pro- duction of pressure equipment	June 2000	C 202 18.07.01
DIN EN 12420 ¹⁾	Copper and copper alloys; Forgings	March 1999	C 348 05.12.00
DIN EN 12434	Cryogenic vessels – Cryogenic flexible hoses	November 2000	C 202 18.07.01
DIN EN 124511)	Copper and copper alloys – Seamless, round tubes for heat exchangers	October 1999	C 348 05.12.00
DIN EN 12452 ¹⁾	Copper and copper alloys; Rolled, finned, seamless tubes for heat exchangers	October 1999	C 210 22.07.00
DIN EN 12517	Non-destructive examination of welds; Radiographic examination of welded joints; Acceptance levels	March 1998	C 227 10.08.99

Annex 5 Index of harmonized standards governing pressure equipment

Standard No.	Description	Issue date	Published in OJ
DIN EN 13133	Brazing — Brazer approval	December 2000	C 202 18.07.01
DIN EN 13134	Brazing — Procedure approval	December 2000	C 202 18.07.01
DIN EN ISO 9606-3	Approval testing of welders; Fusion welding – Part 3: Copper and copper alloys	June 1999	C 210 22.07.00
DIN EN ISO 9606-4	Approval testing of welders; Fusion welding – Part 4: Nickel and nickel alloys	June 1999	C 210 22.07.00
DIN EN ISO 9606-5	Approval testing of welders – Fusion welding – Part 5: Titanium and titanium alloys, zirconium and zirconi- um alloys	April 2000	C 348 05.12.00
DIN EN ISO 9692-2			C 210 22.07.00

This harmonized supporting material standard guarantees only that the technical data of the materials named within it comply with the basic safety requirements. This does not represent a statement of their suitability for a particular item of pressure equipment. The technical data indicated in this material standard must therefore be evaluated according to the design requirements of the item of pressure equipment in question to assess whether the basic safety requirements of Directive 97/23/EC are met (refer to the Official Journal of the EC C 362 of 16 December 2000, p. 2).

Note:

The following harmonized standards the references of which have been published in the Official Journal of the EC have since been deleted from the reference in accordance with the Commission's amendment (Official Journal of the EC 2001/C 74/18 of 7 March 2001):

Standard No.	Description	Issue date	Published in OJ
DIN EN 10268	Cold-rolled flat products made of high yield strength micro-alloyed steels for cold forming; General deliv- ery conditions; German version EN 10268:1998	February 1999	C 227 10.08.99
DIN EN 12482-1	Aluminium and aluminium alloys; Reroll stock for general applications - Part 1: Specifications for hot rolled reroll stock	October 1998	C 227 10.08.99
DIN EN ISO 898-5	Mechanical properties of fasteners made of carbon steel and alloy steel - Part 5: Set screws and similar fasteners not under tensile stress	October 1998	C 227 10.08.99
DIN EN ISO 14555	Welding - Arc stud welding of metallic materials	December 1998	C 227 10.08.99

Deletion of these references was reported in the BMA's communication dated 27 March 2001 (BArbBl. 5/2001, p. 97), and the index of references of harmonized standards for pressure equipment published in the BMA's communication dated 12 January 2001 (BArbBl. 3/2001, p. 137) thus corrected accordingly.

Annex 6 Abbreviations

AD	Arbeitsgemeinschaft Druckbe- hälter (working group for pres- surized vessels)	GSGV	Verordnung zum Gerätesicher- heitsgesetz (Ordinance regu- lating the German Equipment
BArbBI.	Bundesarbeitsblatt (Federal	22	Safety Act)
D1.4.4	Labour Gazette)	SC	Technical Subcommittee
BMA	Bundesministerium für Arbeit und Sozialordnung (German	TC	Technical Committee
	Federal Ministry of Labour and Social Affairs)	TRB	Technische Regeln Druckbe- hälter (technical rules for pres- sure vessels)
CEN	European Committee for Standardization	TRD	Technische Regeln Dampfkes- sel (technical rules for steam
CENELEC	European Committee for Elec-		boilers)
CEN/BT	trotechnical Standardization CEN Technical Board	TRR	Technische Regeln Rohrleitungen (technical rules for piping)
CEN/TC	CEN Technical Committee	TS	CEN/TC Technical Secretariat
CMC	CEN Management Center	WG	Working Group
CR	CEN Report		
ECISS	European Committee for Iron and Steel Standardization	CEN me	mbers indicated in the report:
ETSI	European Telecommunications Standards Institute	AFNOR	Association Française de Nor- malisation (France)
FNCA	Normenausschuss Chemischer	BSI	British Standards Institution
	Apparatebau im DIN (DIN Standards Committee for Chemical Apparatus Engineer-	DIN	Deutsches Institut für Normung e.V. (Germany)
	ing)	DS	Dansk Standard (Denmark)
GA 54	Gemeinschaftsausschuss "Druckbehälter" ("Pressure	NEN	Nederlands Normalisatie- instituut (Netherlands)
	Vessels" joint committee)	NSAI	National Standards Authority
GRP	glassfibre-reinforced plastics		of Ireland
GSG	Gerätesicherheitsgesetz (German Equipment Safety Act)	UNI	Ente Nazionale Italiano di Unificazione (Italy)