"Application of codes & Standards in Chemical Process Industries"

Brief Overview

- **ASME - American Code Requirements**
- **Pressure Equipment Directive 2014/68/EU (European)**
- **Technical Regulation TR TS 032/2013 (Russian)**

By Velpula Prasanna
15th July 2017

Vessels Fabricator

- State of art facility
- Excellent Experience
- Experienced Personnel
- Large capacity
- Reputed supplier

Exporting Pressure Equipment

U

ASME

SETTING THE STANDARD

CE PED

2014/68/EU

GOST-R

International CODES for PRESSURE VESSELS

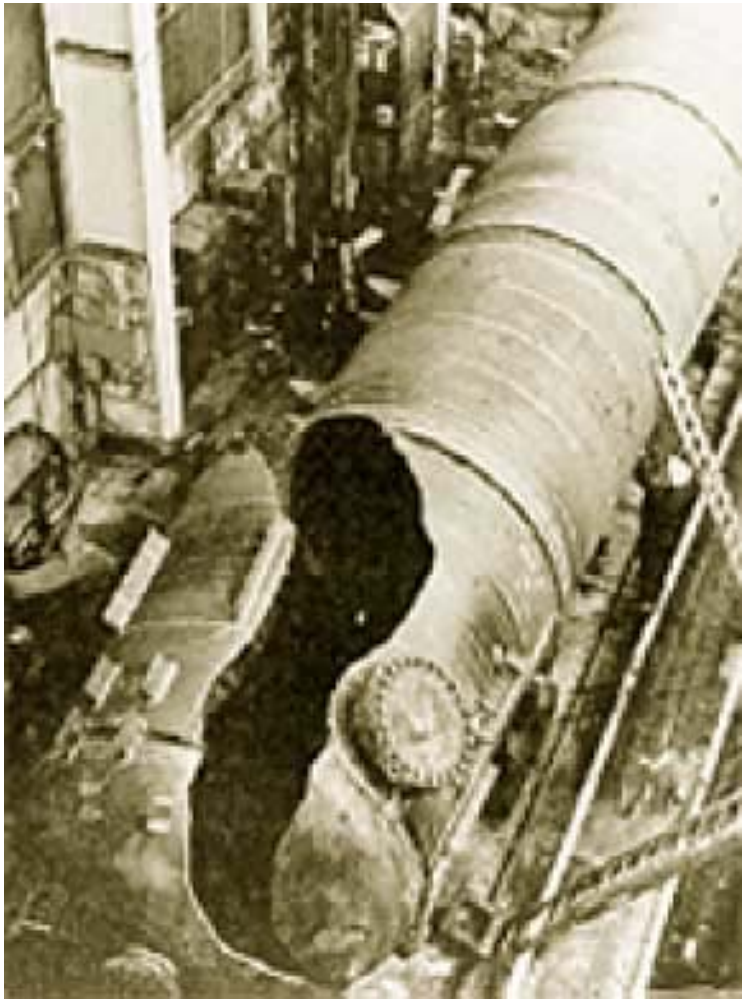
Country	Code of Construction of Pressure Vessel
China	GB 150
Europe	EN 13445
France	CODAP 2005
Germany	AD2000
Great Britain	PD 5500
India	IS 2825
United States	**ASME Sec VIII Division 1**
Japan	JIS B 8265
Korea	KEPIC MG
The Netherlands	RTOD
Russia	**GOST R 52630**

DIRECTIVE 2014/68/EU → Europe

National Board → United States

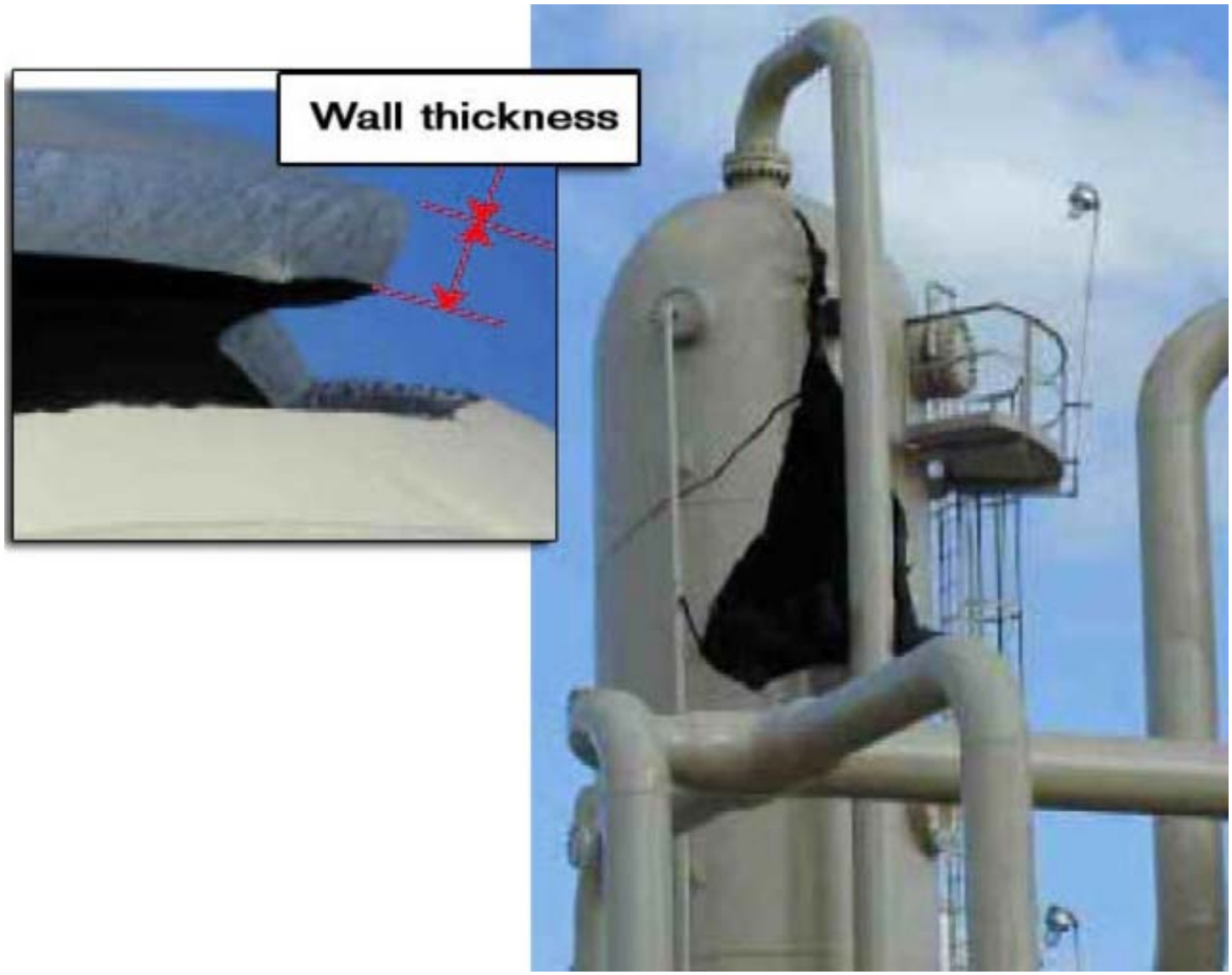
REGULATIONS TR TS 032 → Russia

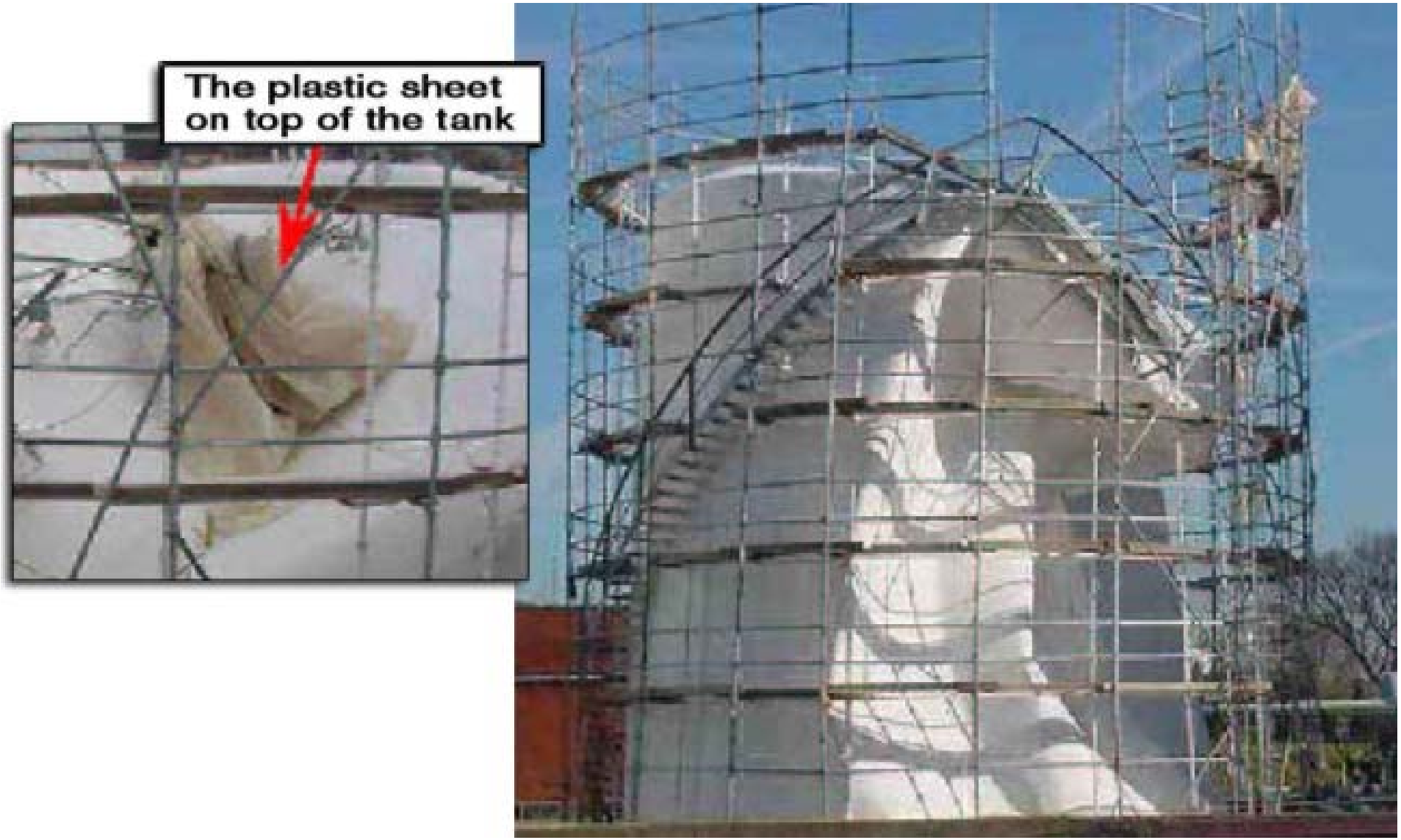
Industrial Equipment's / Electronics / Medical Devices / Lifts etc.



Vessel ruptured

Material Failures


Wall thickness


The plastic sheet
on top of the tank

International Standards / Regulations / Directives / Rules

These play a large role in trade

Examples of Organization Developing Standards for Worldwide market include:

ASME

ASTM

ISO Standards

IEEE

EN

IDEAL to have ONE Universal Code / Standard

Safety

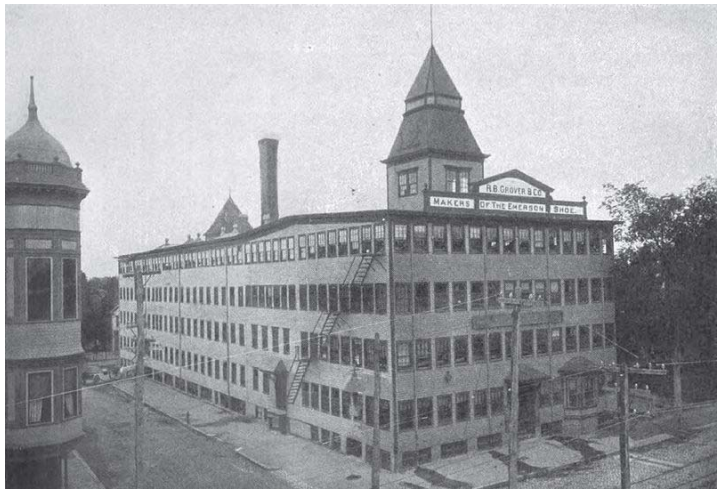
Grover Shoe Factory Disaster

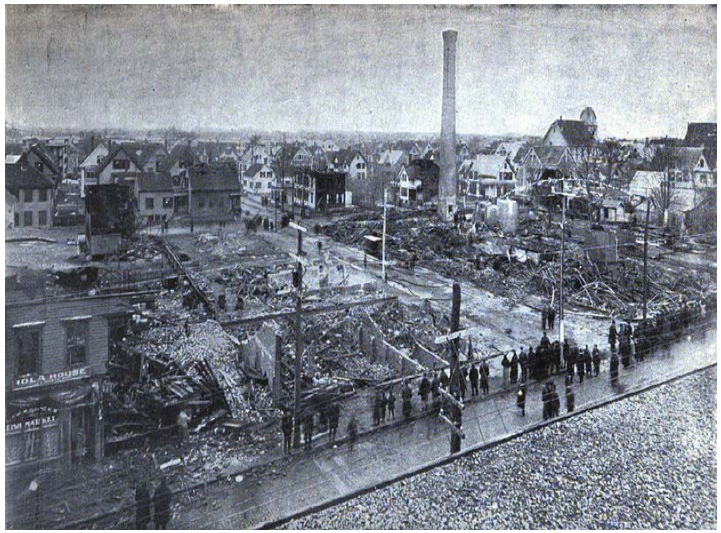
The boiler rocketed up three floors, through the roof and landed on a nearby home, knocking off an elevated water tower.

The water tower smashed through the roof causing most of the building to collapse inward.

Coal from the boiler's fire pit scattered everywhere and the wooden building caught on fire instantly.

It caused 58 deaths and 150 reported injuries





HISTORY

Timeline of Early ASME Standardization Milestones

1880
ASME founded to address issues with industrialization and mechanization

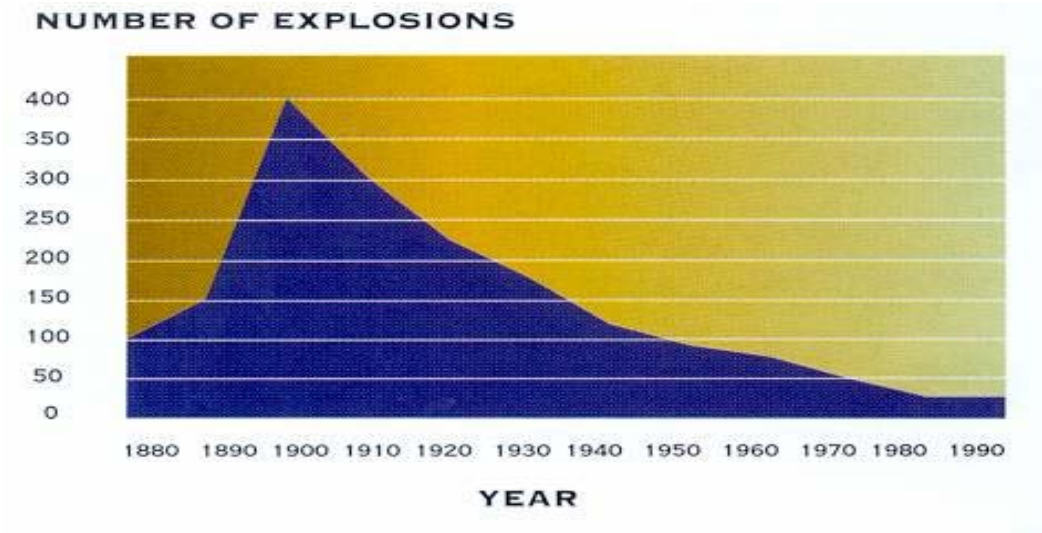
1884
Issues first standard, Code for the Conduct of Trials of Steam Boilers

1905
Standard for Proportions of Machine Screw Sizes

1914
First edition of the Boiler and Pressure Vessel Code

1916
Safety Code for Cranes

1921
Safety Code for Elevators



About the ASME Boiler and Pressure Vessel Certification Program

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The ASME BPVC **Certification Program conforms** to the rules governing the **design, fabrication, assembly, and inspection** of boiler and pressure vessel components during construction.

Products manufactured by ASME BPVC Certificate Holders are **certified** and **stamped** with the Certification Mark in accordance with the applicable ASME BPVC Section.

Today there are more than **6,800 Certificate Holders** in the ASME BPVC Certification Program

ASME Conformity Assessment

Process by which a product is shown to be in **full compliance** with a standard

ASME accredits manufacturers who produce products compliant with their codes and standards

There are over **9,000 ASME accreditation** account holders worldwide

ASME Certificates Offered

Power Boilers
Section I

- S - Power Boilers
- A - Assembly of Power Boilers
- E - Electric Boilers
- M - Miniature Boiler
- PP - Pressure Piping
- V - Boiler Pressure Relief Valves
- PRT - Parts Fabrication

Heating Boilers
Section IV

- H - Heating Boilers/Cast Iron Sectional Heating Boiler
- HLW - Lined Potable Water Heaters
- HV - Heating Boiler Safety Valves
- PRT - Parts Fabrication

Pressure Vessels
Section VIII Division 1

- U - Pressure Vessels
- UM - Miniature Pressure Vessels
- UV - Pressure Vessel Pressure Relief Valves
- UD - Pressure Vessel Pressure Relief Devices
- PRT - Parts Fabrication

Pressure Vessels
Section VIII Division 2

- U2 - Pressure Vessels (Alternative Rules for Pressure Vessels)

Pressure Vessels
Section VIII Division 3

- U3 - High Pressure Vessels
- UV3 - High Pressure Vessel Pressure Relief Valves
- UD3 - High Pressure Vessel Pressure Relief Devices

Reinforced Plastic Vessels
Section X

- RP - Fiber-Reinforced Plastic Vessels

Transports Tank
Section XII

- T - Transport Tanks
- TV - Transport Tanks Pressure Relief Valves
- TD - Transport Tanks Pressure Relief Devices
- PRT - Parts Fabrication

Authorized Inspection Agency Accreditation Program

An **Authorized Inspection Agency (AIA)** is an organization that meets the criteria of the ASME QAI-1 standard, "Qualifications for Authorized Inspection"

Authorized Inspection Agencies include:

- **Jurisdictional Authorities:** A jurisdiction that accepts and does administer one or more construction code sections of ASME Boiler and Pressure Vessel Code (BPVC) as a means to satisfy legal or regulatory requirements.

- **Insurance Companies:** An insurance company which has been licensed, or registered, by the appropriate authority of a state of the United States of America, or of a province of Canada, to write boiler and pressure vessel insurance in such state or province.

- **Independent Third-Party Inspection Organizations:** A company in the business of providing third party inspection services, which has government recognition to perform inspection and design reviews for boilers and pressure vessels.

MANUFACTURER DEMONSTRATION OF ASME COMPLIANCE

The purpose of the Demonstration is to evaluate the Applicant's **Quality Control System** (QCS) and its implementation.

For evaluation of the QCS, the **Applicant must demonstrate** to current Code rules sufficient administrative and fabrication functions of the QCS. to show that they have the **knowledge** and **ability to produce** the Code items typical of those covered by the QCS.

It is expected that fabrication functions be **demonstrated** using **typical Code work**. However they may be demonstrated using **current work,** a **mock-up**, or a **combination of the two**.

MANNUFACTURER DEMONSTRATION OF ASME COMPLIANCE

- GENERAL QUALITY CONTROL SYSTEM REQUIREMENTS
- AUTHORITY AND RESPONSIBILITY
- ORGANIZATION
- DRAWING, DESIGN CALCULATIONS, AND SPECIFICATION CONTROL
- MATERIAL CONTROL
- EXAMINATION AND INSPECTION PROGRAM
- CORRECTION OF NONCONFORMITIES
- WELDING
- NONDESTRUCTIVE EXAMINATION
- HEAT TREATMENT
- CALIBRATION OF MEASUREMENT AND TEST EQUIPMENT
- RECORDS RETENTION
- AUTHORIZED INSPECTOR (AI) Agreement
- CERTIFICATIONS

How do Standards Affect an Engineer?

- Material Selection
- Design Requirements
- Fabrication Requirements
- Examination and Testing Requirements
- Quality Documentation

Material Selection

Standards provide a list of allowable materials

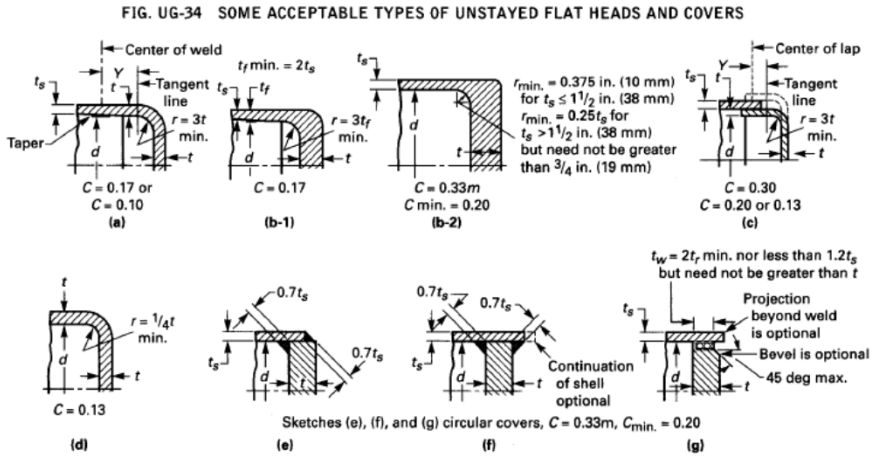
Provide maximum allowable stresses

Users have *choice*

Design Requirements

Standards provide minimum design requirements

Ex. Section VIII-1 has a design margin on 3.5



Fabrication Requirements

Material requirements

i.e. cutting, grinding

Tolerances

i.e. Bolt spacing

Attachment

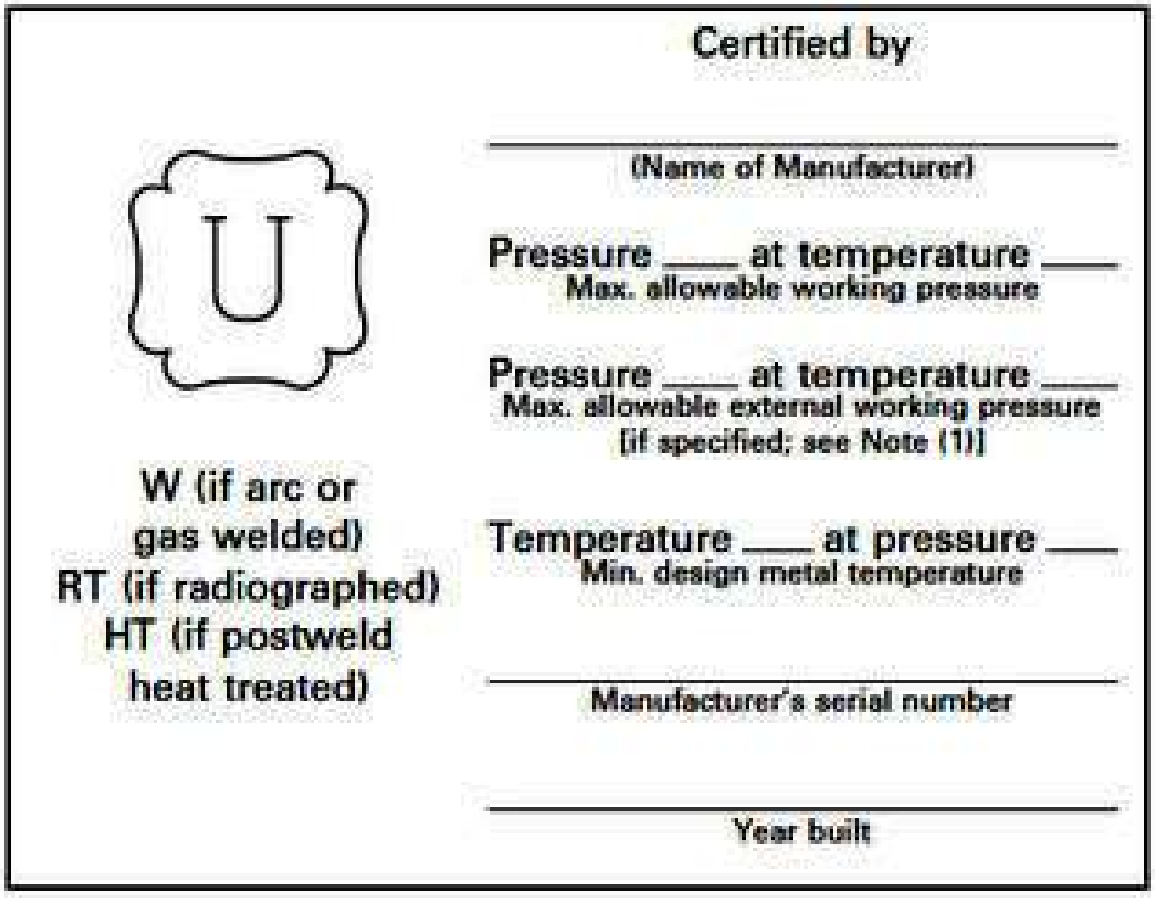
Welding

Bolting

Inspection & Testing

Quality Documentation

Vessel Complied to ASME Sec VIII Division 1



- End of ASME PRESENTATION -

CE marking

https://ec.europa.eu/growth/single-market/ce-marking

The letters 'CE' appear on many products traded on the extended Single Market in the European Economic Area (EEA). They signify that products sold in the EEA have been assessed to meet high safety, health, and environmental protection requirements. When you buy a new phone, a teddy bear, or a TV within the EEA, you can find the CE mark on them. CE marking also supports fair competition by holding all companies accountable to the same rules.

There are **two main benefits CE marking** brings to businesses and consumers within the EEA:

- **Businesses** know that products bearing the CE marking can be traded in the EEA without restrictions.

- **Consumers** enjoy the same level of health, safety, and environmental protection throughout the entire EEA.

Country	Code of Construction of Pressure Vessel
China	GB 150
Europe	EN 13445
France	CODAP 2005
Germany	AD2000
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India	IS 2825
United States	**ASME Sec VIII Division 1**
Japan	JIS B 8265
Korea	KEPIC MG
The Netherlands	RTOD
Russia	**GOST R 52630**

The European Economic Area (EEA)

The EEA includes EU countries and also **Iceland, Liechtenstein** and **Norway.** It allows them to be part of the EU's single market.

The EU countries are:
Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the UK.

EU CE Marking Directives

- **Machinery Directive – 2006/42/EC.**
- **Low Voltage Directive – 2014/35/EU.**
- **EMC Directive – 2014/30/EU.**
- **Medical Devices Directive – 93/42/EEC.**
- **Personal Protective Equipment Directive – 89/686/EEC.**
- **Construction Products Regulation – Regulation (EU) No 305/2011**.
- **Pressure Equipment Directive – 2014/68/EU**.

Economic operators should be responsible for the compliance of pressure equipment and assemblies with the requirements of this Directive, in relation to their respective roles in the supply chain, so as to ensure a high level of protection of **public interests**, such as **health** and **safety of persons**, and the **protection of domestic animals** and of **property**, and to guarantee fair competition on the Union market.

Pressure Equipment Directive

Legal Framework

The new **Directive 2014/68/EU** will fully enter into force on 20 July 2016.

Products covered

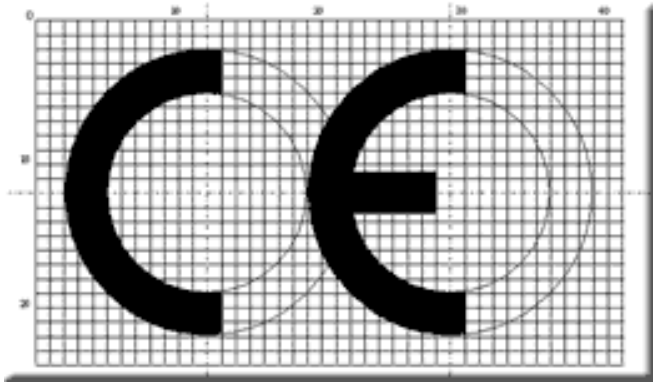
The Pressure Equipment Directive covers a very broad range of products such as:

- Pressure vessels
- Steam boilers
- Piping
- Safety accessories
- Pressure accessories
- Assemblies

Industries

Oil & gas, chemical,
Pharmaceutical,
Plastics and Rubber and
Food and beverage industry),
High temperature process industry
(glass, paper and board),
Energy production and in
Supply of utilities,
Heating, Air conditioning and
Gas storage and Ttransportation.

The CE mark on Pressure Vessel



CE

The letters **"CE"** are the abbreviation of **French phrase "Conformité Européene"** which literally **means "European Conformity"**

Groups of FLUIDS

For the purpose of classification, the fluids (media in the pressure equipment) are divided into two groups:

Group 1 > Hazardous fluids

Group 2 > all other fluids that are not included in Group 1

Objectives

The legal framework established by the Pressure Equipment Directive aims to guarantee free movement of these products in the internal market while ensuring a high level of safety.

PED Guidelines

PED Guidelines are established and agreed in the framework of the Commission's Working Group "Pressure". Read more on PED Guidelines.

Materials

The Pressure Equipment Directive requires that materials used for pressure equipment

A. **Comply with a Harmonized Material Standard;**

B. **Be covered by a European Approval of Materials (EAM);**

C. **Particular material appraisal (PMA)**

B. European Approval of Materials (EAM)

Means a technical document defining the characteristics of materials intended for repeated use in the manufacture of pressure equipment which are not covered by any harmonized standard

C. Particular material appraisal (PMA)

A Particular Material Appraisal (PMA) is the process by which the pressure equipment manufacturer ensures that each proposed material that is not in a harmonized standard or covered by a European Approval for Materials (EAM) conforms to the applicable Essential Safety Requirements (ESR) for materials. Particular material appraisals are part of the “records and correspondence relating to conformity assessment”

A. Harmonized Material Standard

Summary list of titles and references of harmonized standards under Directive 2014/68/EU for Pressure equipment

ESO: European standardization organization

CEN: http://www.cen.eu

CENELEC: http://www.cenelec.eu

ETSI: http://www.etsi.eu

The main harmonized standards

1. **Unfired pressure vessels EN 13445**

and

2. **Metallic industrial piping EN 13480**

Harmonized Material Standard List

Essential Safety Requirements

The Pressure Equipment Directive contains in its **Annex I** the Essential Requirements that a pressure equipment or assembly must meet when placed and/or put into service on the EU market. **It does not indicate how these requirements must be met, thus leaving flexibility to manufacturers as regards technical solutions to be adopted.**

General

- **Eliminate or reduce hazards as far as is reasonably practicable;**
- **Apply appropriate protection measures against hazards which cannot be eliminated.**
- **Inform users of residual hazards and indicate whether it is necessary to take appropriate special measures to reduce the risks at the time of installation and/or use.**

Design

- **Design for adequate strength – Erosion, Decomposition of unstable fluids**
- **Calculation Method: Design by Formulae, Analysis, Fracture mechanics**

Essential Safety Requirements…Contd

Others Include

- **Eliminate or reduce hazards as far as is reasonably practicable;**
- **Means of draining and venting.**
- **Corrosion or other chemical attack.**
- **Wear**
- **Assemblies**
- **Provisions for filling and discharge**
- **Protection against exceeding the allowable limits of pressure equipment**
- **Safety accessories**
- ***Pressure limiting devices***
- **External fire etc..**

Conformity Assessment Tables

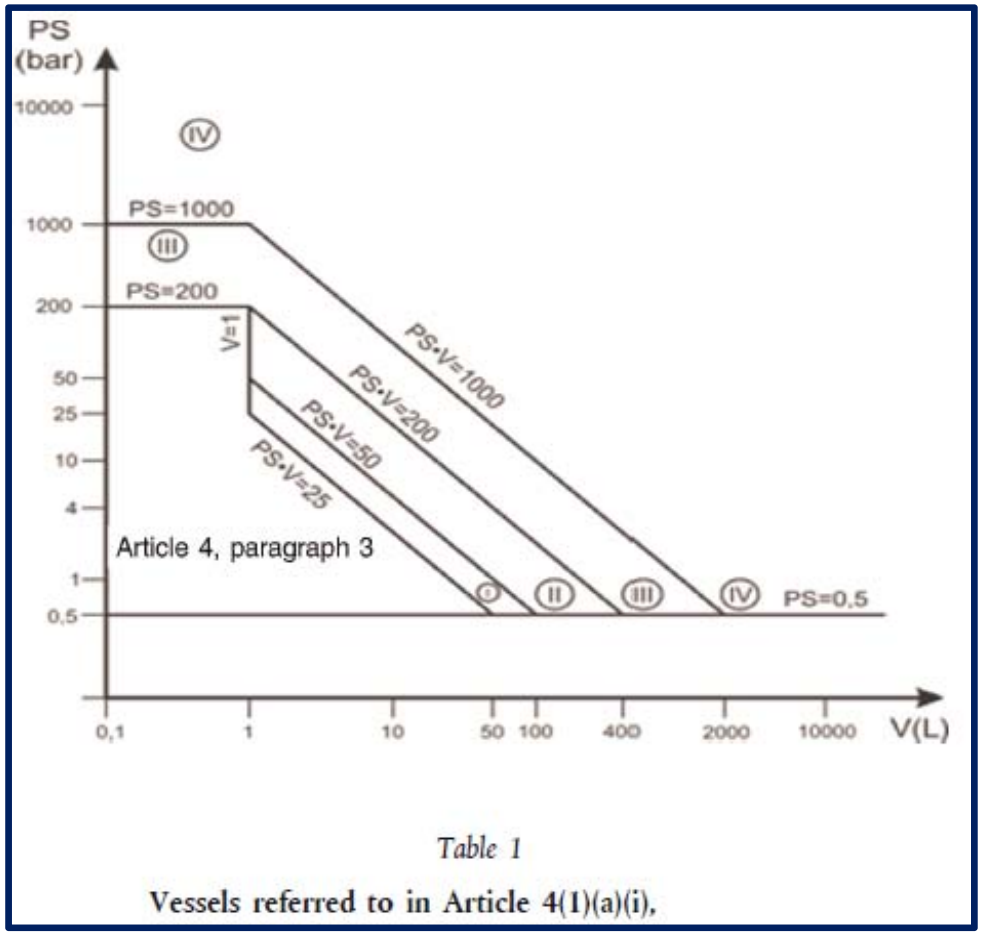


Table 1

Vessels referred to in Article 4(1)(a)(i),

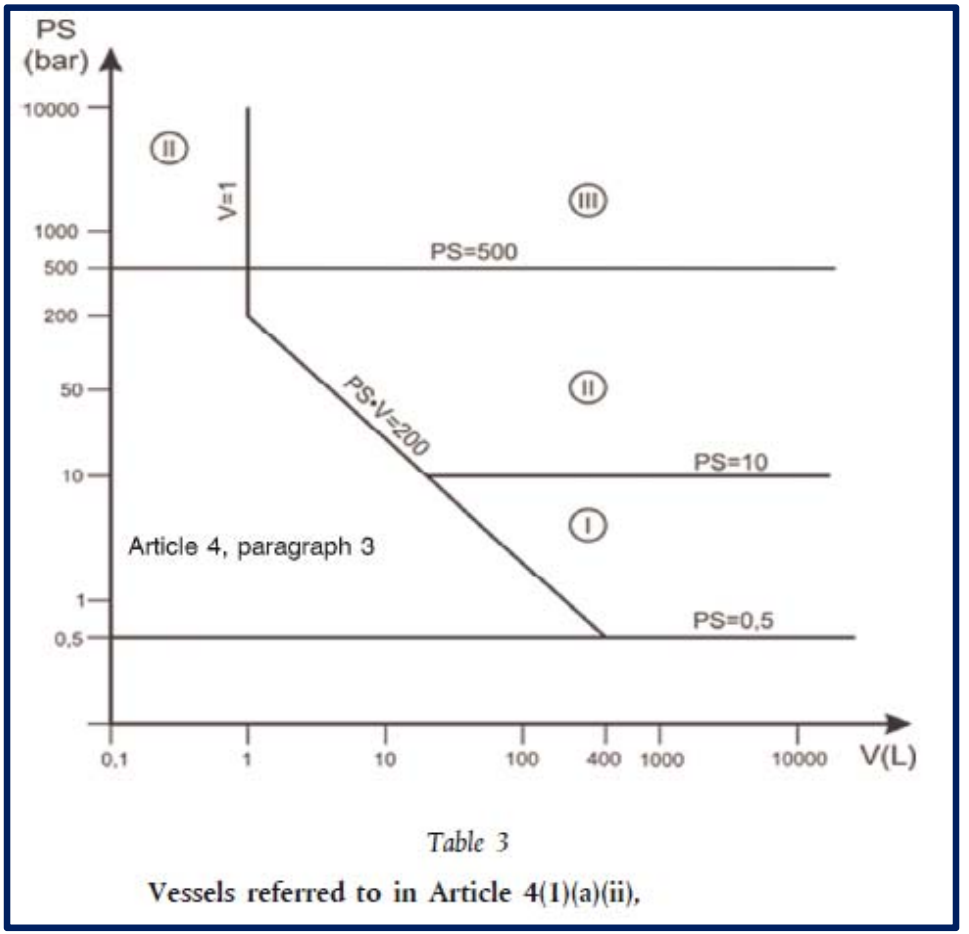


Table 3

Vessels referred to in Article 4(1)(a)(ii),

Conformity Assessment Tables Contd..

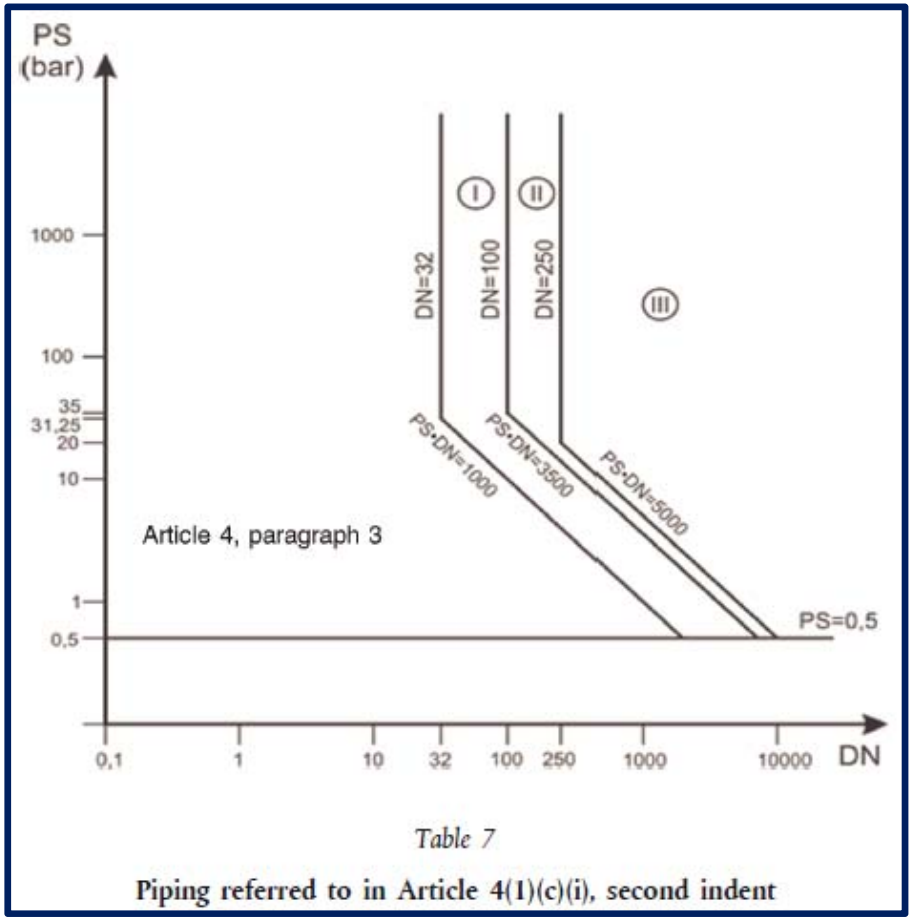


Table 7

Piping referred to in Article 4(1)(c)(i), second indent

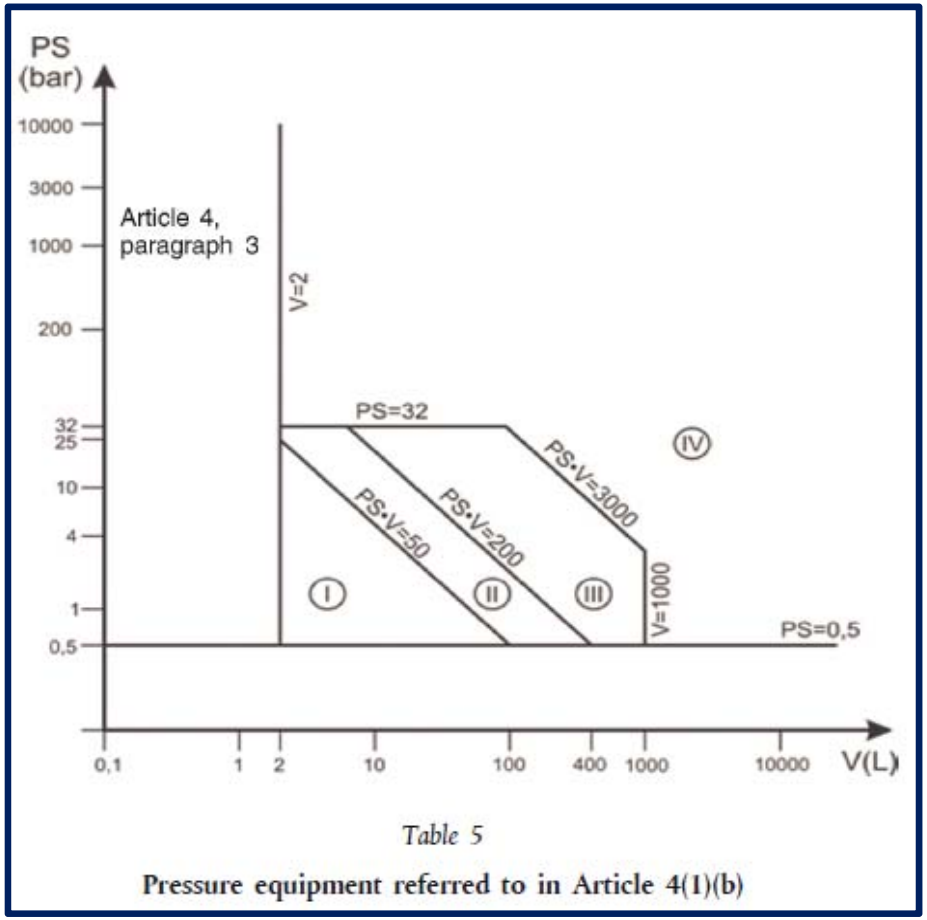
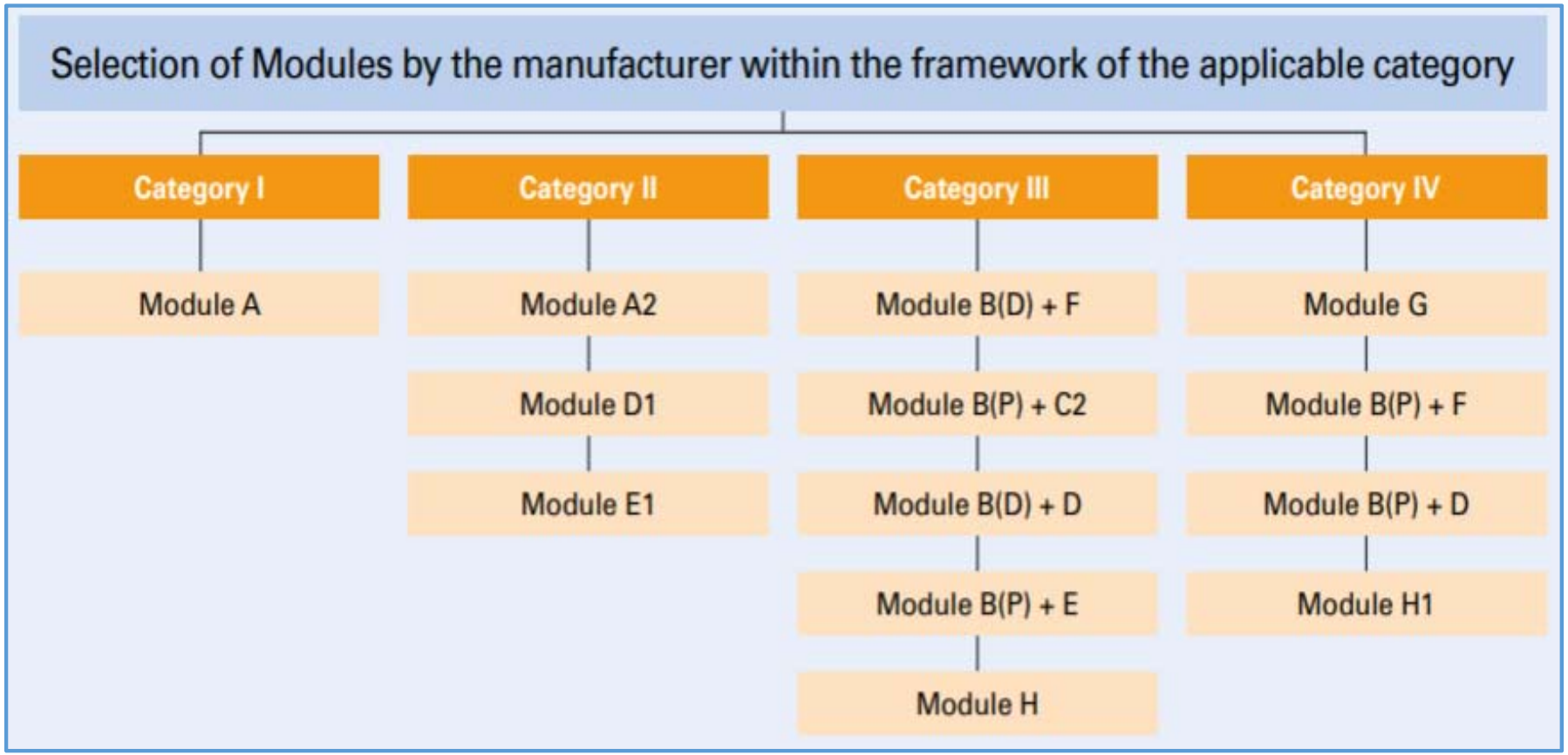


Table 5

Pressure equipment referred to in Article 4(1)(b)

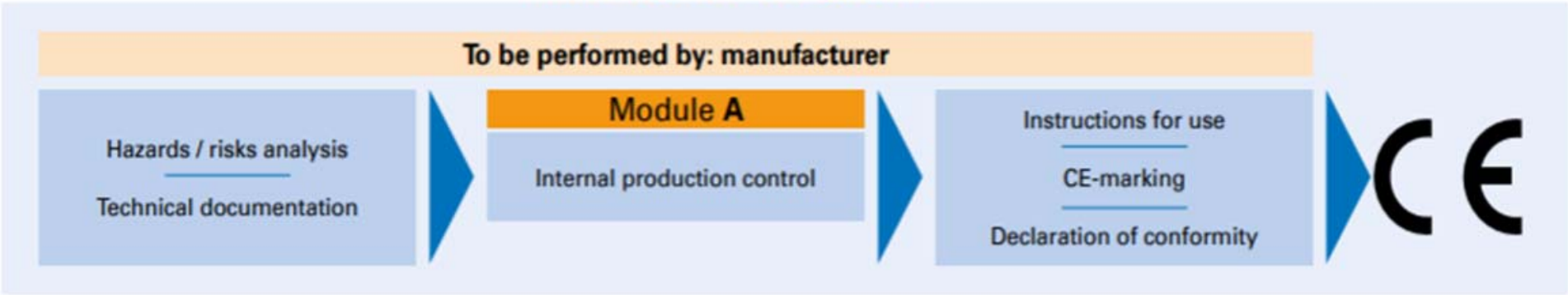
Conformity Assessment

The PED requires third party involvement in the conformity assessment of products depending on the level of the hazard.

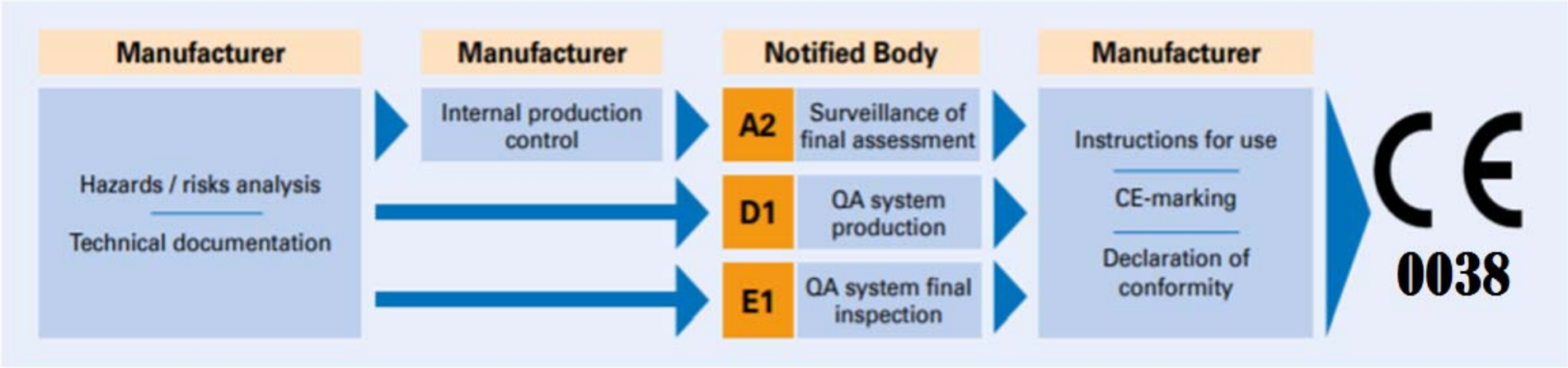


Conformity Assessment

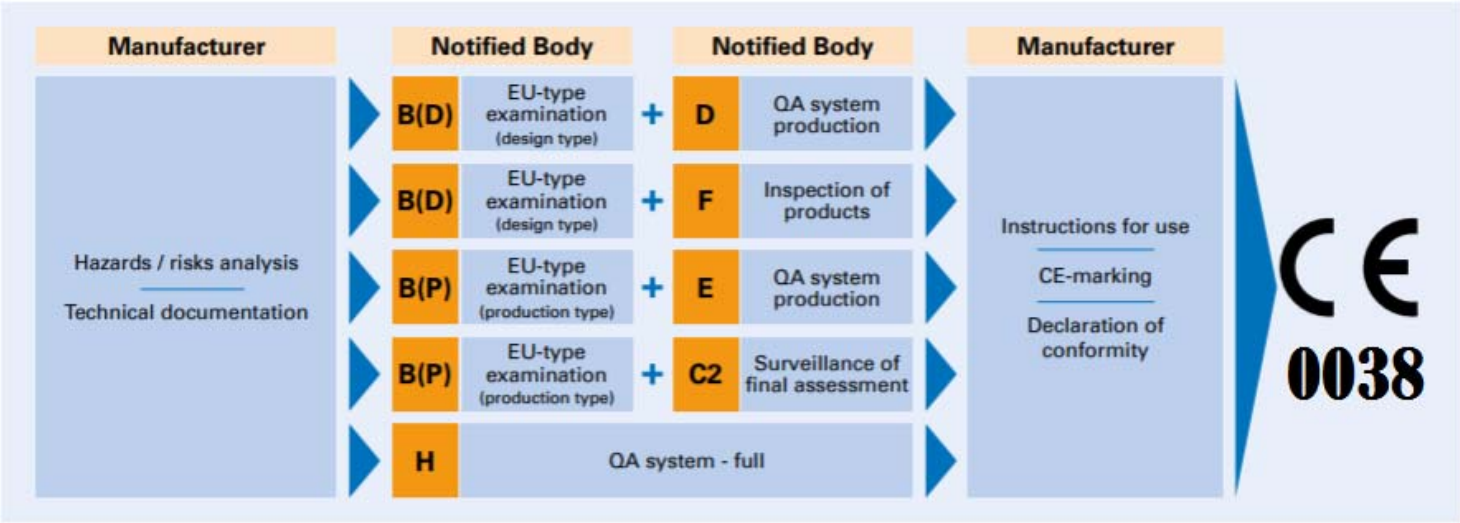
Modules for Category I



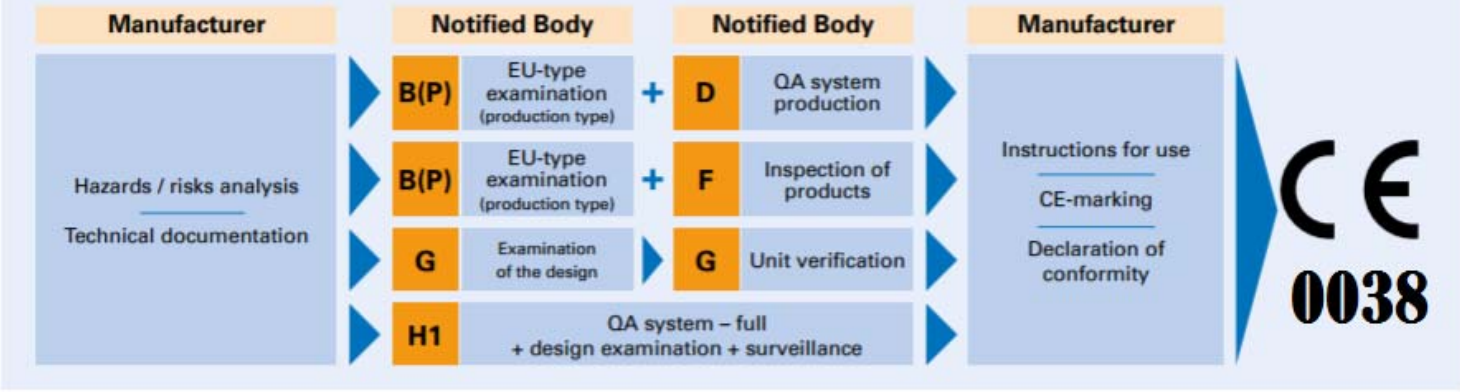
Modules for Category II



Modules for Category III



Modules for Category IV



NOTITIFIED BODIES

Body type	Name ▲	Country ▲
NB 0026	VINÇOTTE sa/nv	Belgium
NB 0027	VERENIGING BUREAU VERITAS	Belgium
NB 0028	INSTITUTO DE SOLDADURA E QUALIDADE	Portugal
NB 0029	APRAGAZ A.S.B.L.	Belgium
NB 0035	TÜV Rheinland Industrie Service GmbH	Germany
NB 0036	TÜV SÜD Industrie Service GmbH	Germany
NB 0037	ZURICH ENGINEERING	United Kingdom
NB 0038	Lloyd's Register Verification Limited	United Kingdom
NB 0040	BRITISH ENGINEERING SERVICES LTD	United Kingdom
NB 0041	BUREAU VERITAS UK LIMITED	United Kingdom
NB 0044	TÜV NORD CERT GmbH	Germany
NB 0045	TÜV NORD SYSTEMS GMBH & CO. KG	Germany

Bodies

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

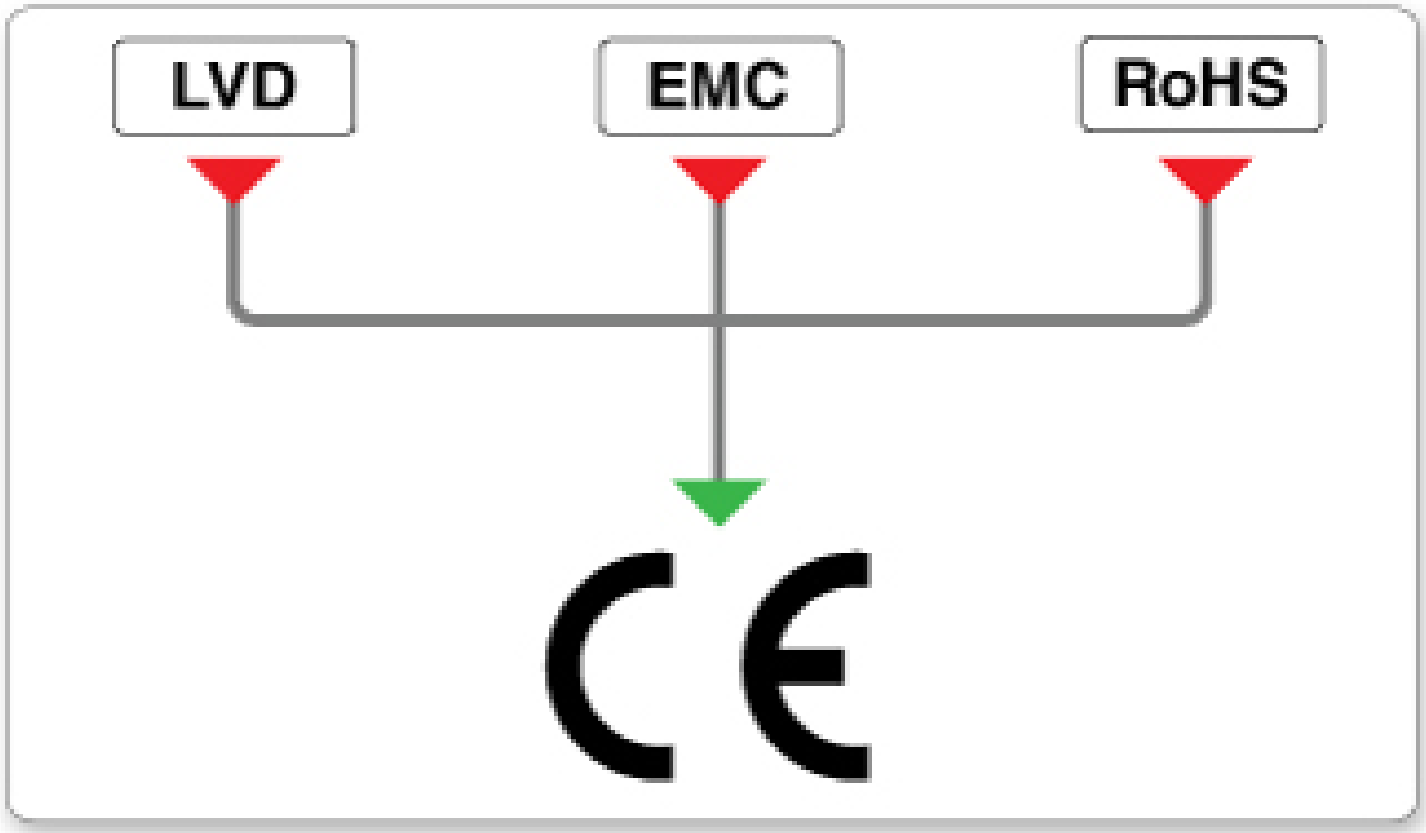
Notified body

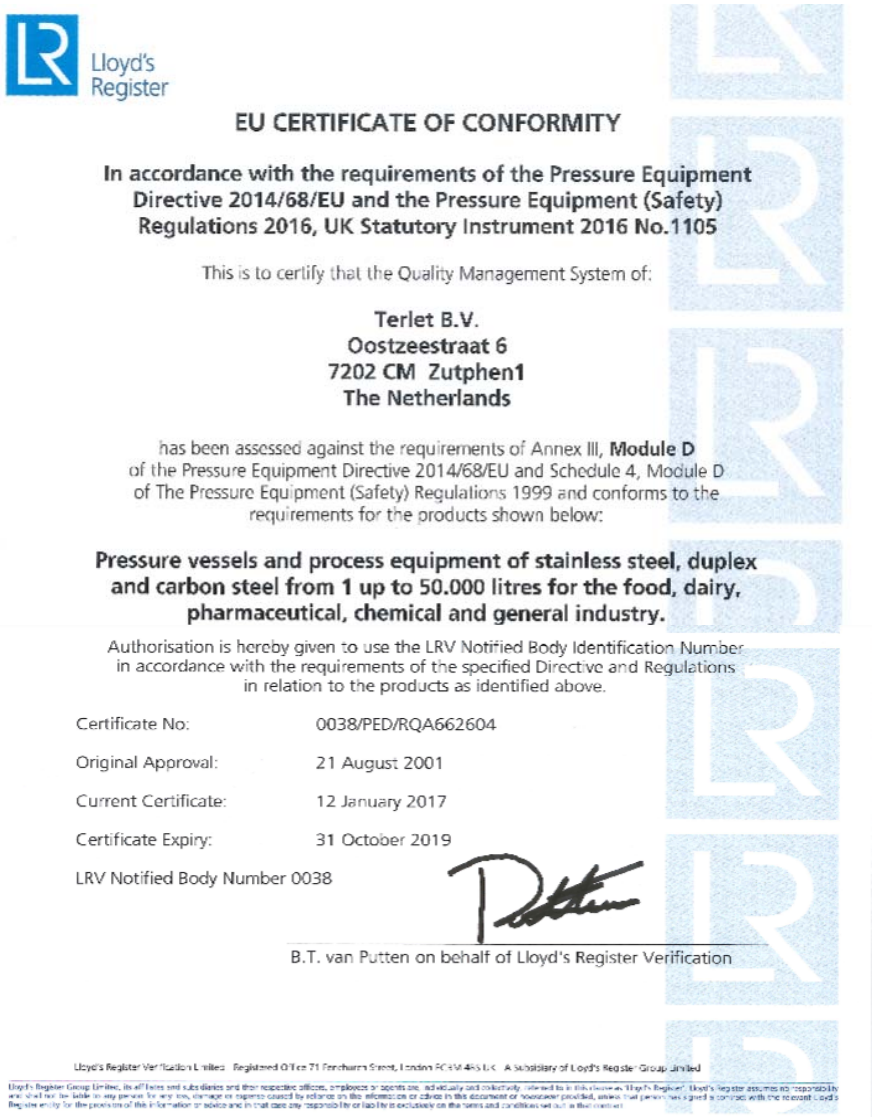
0001-0100	0101-0200	0201-0300	0301-0400	0401-0500
0501-0600	0601-0700	0701-0800	0801-0900	0901-1000
1001-1100	1101-1200	1201-1300	1301-1400	1401-1500
1501-1600	1601-1700	1701-1800	1801-1900	1901-2000
2001-2100	2101-2200	2201-2300	2301-2400	2401-2500
2501-2600	2601-2700	2701-2800		

A notified body is an organization designated by an EU country to assess the conformity of certain products before being placed on the market. These bodies carry out tasks related to conformity assessment procedures set out in the applicable legislation, when a third party is required. The European Commission publishes a list of such notified bodies.

http://ec.europa.eu/growth/single-market/goods/building-blocks/notified-bodies_en

The CE mark for Other Directives





Lloyd's Register

EU CERTIFICATE OF CONFORMITY

In accordance with the requirements of the Pressure Equipment Directive 2014/68/EU and the Pressure Equipment (Safety) Regulations 2016, UK Statutory Instrument 2016 No.1105

This is to certify that the Quality Management System of:

Terlet B.V.
Oostzeestraat 6
7202 CM Zutphen1
The Netherlands

has been assessed against the requirements of Annex III, **Module D** of the Pressure Equipment Directive 2014/68/EU and Schedule 4, Module D of The Pressure Equipment (Safety) Regulations 1999 and conforms to the requirements for the products shown below:

Pressure vessels and process equipment of stainless steel, duplex and carbon steel from 1 up to 50.000 litres for the food, dairy, pharmaceutical, chemical and general industry.

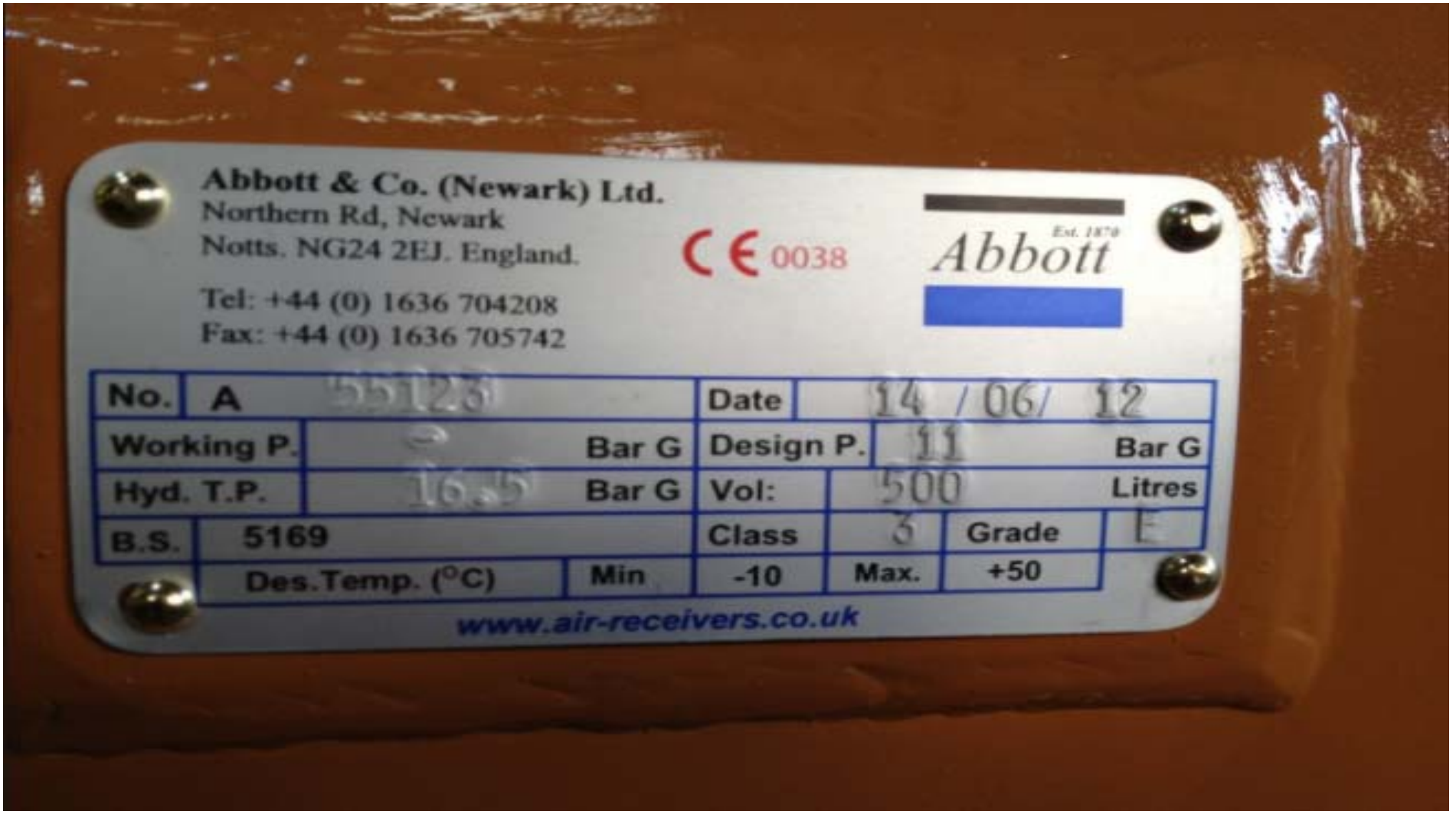
Authorisation is hereby given to use the LRV Notified Body Identification Number in accordance with the requirements of the specified Directive and Regulations in relation to the products as identified above.

Certificate No:	0038/PED/RQA662604
Original Approval:	21 August 2001
Current Certificate:	12 January 2017
Certificate Expiry:	31 October 2019

LRV Notified Body Number 0038

B.T. van Putten on behalf of Lloyd's Register Verification

Notified Body issuing the Certificate of Conformity after compliance to the PED Directive


Abbott & Co. (Newark) Ltd.
Northern Rd, Newark
Notts. NG24 2EJ. England.
Tel: +44 (0) 1636 704208
Fax: +44 (0) 1636 705742
CE 0038
Abbott
Est. 1870
No. A 55123
Date 14 / 06 / 12
Working P. Bar G
Design P. 11 Bar G
Hyd. T.P. 16.5 Bar G
Vol: 500 Litres
B.S. 5169
Class 3
Grade E
Des.Temp. (°C)
Min -10
Max. +50
www.air-receivers.co.uk

- End of PED PRESENTATION -

EEU Technical Regulation for PRESSURE EQUIPMENT

Background information:

CU TR (EEU) is Customs Union Technical Regulation;

Eurasian Economic Union members:

- Armenia (2 Jan 2015)
- Belarus (1 Jan 2015)
- Kazakhstan (1 Jan 2015)
- Kyrgyzstan (12 Aug 2015)
- Russia (1 Jan 2015)

Product Certification Legislation(customs union certificate)

The technical regulations are definitions of standards which establish the characteristics of products and their production processes in terms of quality, security, technical requirements, etc.

The new legislation has been established to replace the old GOSTR standard which no longer reflects the requirements of modern production and industry.

The so called GOSTR which stands for "Gosudarstvenniy standard" or "state standard" is a concept that first appeared in 1928 and had become over the years a formality with certificates being issued often without any further request of documents or samples.

Product certification had become to a certain extend a business in which the main concepts of security and quality had disappeared.

Enforced Technical Regulations

TR CU 004/2011 On safety of low voltage equipment
TR CU 005 2011 On safety of packages
TR CU 006/2011 On safety of fireworks
TR CU 009/2011 On safety of perfumes and cosmetics
TR CU 010/2011 On safety of machinery and equipment
TR CU 012/2011 On safety of equipment for work in explosive environments
TR CU 032/2013. Technical Regulations of the Customs Union «On the safety equipment of high pressure
TR CU 017/2011 On safety of light industry products
TR CU 020/2011 Electromagnetic compatibility of technical equipment
TR CU 021/2011 On safety of food products
TR CU 022/2011 Food products in terms of its marking
TR CU 025/2012 On safety of furniture
TR CU 026/2012 On safety of small crafts
TR CU 027/2012 On safety of certain types of specialized food products, including foods for dietary treatment and dietary preventive nutrition
TR CU 028/2012 On safety of explosives and products based on them
TR CU 029/2012 Requirements for the safety of food additives, flavorings and technological aids
TR CU 030/2012 On requirements for lubricants, oils and special fluids
TR CU 031/2012 On safety of agricultural and forestry tractors and their trailer
TR CU 018/2011 On safety of wheeled vehicles
TR CU 019/2011 On safety of personal protective equipment
TR CU 001/2011 On safety of railway rolling stock
TR CU 002/2011 On safety of high-speed railway transport
TR CU 003/2011 On safety of railway transport infrastructure
TR CU 007/2011 On safety of products, intended for children and adolescents
TR CU 008/2011 On safety of toys
TR CU 011/2011 Safety of lifts
TR CU 013/2011 On requirements to automobile and aviation gasoline, diesel and marine fuel, jet fuel and heating oil
TR CU 014/2011 Safety of motor road
TR CU 015/2011 On safety of grain
TR CU 016/2011 On safety of devices operating on gaseous fuel
TR CU 023/2011 Technical regulation for juice products of fruits and vegetables
TR CU 024/2011 Technical regulation on oil and fat products

EEU Technical Regulation for PRESSURE EQUIPMENT

CU TR 032/2013 “On safety of high pressure equipment”

Applies to equipment that works under pressure, applies to the following types: vessels, boilers, pipelines, pressure-resistant items of equipment (assembly units); **Note:** Depends on the MAWP, Working fluid; Capacity;

CU TR 012/2011 “On the safety of the equipment for operation in explosive atmospheres”

Applies to electrical and nonelectrical equipment used in potentially explosive atmosphere. **Note:** regulation applies to all equipment that contains Ex-marking irrespective of installation area (safety or explosion area).

EEU Technical Regulation for PRESSURE EQUIPMENT

Group 1, which includes working environment consisting of a flammable, oxidizing, flammable, explosive, toxic and highly toxic gases, vapors and liquids in the single-phase state, as well as mixtures thereof;

Group 2 includes all other Fluids which are not assigned to the group 1;

Main Technical regulations used for industrial projects:

On safety of machinery and equipment (TR CU 010/ 2011)

On safety of high pressure equipment (TR CU 032/ 2013)

On safety of low-voltage equipment (TR CU 004/ 2011)

Hardware electromagnetic compatibility (TR CU 020/ 2011)

On the safety of the equipment for operation in explosive atmospheres (TR CU 012/2011)

Certificate of conformity & Declaration of conformity

- Both documents are legal conformity forms of the CU TR;
- Conformity form (DoC or CoC) is determined in accordance with each TR rules, depending on the product type (product working parameters);
- Both conformity forms are applicable for serial production and for a shipment;
- DoC can be replaced by CoC in CU TR 010; CU TR 004; CU TR 020, based on applicant decision;
- DoC cannot be replaced by CoC in CU TR 032;
- For CU TR 012 only CoC is allowable ;
- CoC is issued based on ATL (accredited testing laboratory) testing results for safety requirements;
- DoC is issued based on producer‘s test reports (schemes 1d, 2d) or based on ATL test results for safety requirements (schemes 3d, 4d);

Certification of Conformity shall be provided for equipment of Categories 3 and 4. – CRITIAL VESSELS

Technical Passport

Technical passport of vessel shall contain the following information:

a) general information:
name and address of manufacturer;
date of manufacture (fabrication);
serial number;
design service life;

b) technical characteristics and parameters:
operating, design, testing pressure, MPa (kgf/cm);
operating temperature of operating fluid, °C;
design wall temperature, °C;
minimum allowable wall temperature below zero, °C;
operating fluid name; operating fluid group;
corrosion (erosion) allowance, mm;
capacity, m_3;
empty vessel mass, kg;
maximum mass of filling fluid, kg;

c) information on main components (including quantity, dimensions, material, welding (brazing));

d) information on connecting branches, flanges, lids, fasteners (including quantity, dimensions, material);

e) information on safety devices, main valves, instruments and protection devices (including quantity, nominal diameter, design pressure, body material, mounting location);

f) vessel figures, diagrams, drawings and other documents (summary list of factory modifications, packing list, specification containing basic dimensions of assemble units, etc.);

g) other information ensuring safety vessel operation.

45. For conformity validation, the applicant shall collect the set of equipment documents including:

a) safety case;

b) technical passport of equipment;

c) operation manual (instructions);

d) design documents;

e) strength calculation results and throughput capacity calculation results for safety devices (if any, in accordance with design);

f) process regulations and workflow process information (data on materials used, semi-finished products, components, welding materials, methods and parameters of welding procedures and heat treatment, nondestructive testing procedures and results);

g) information on tests (measurements) carried out;

h) equipment test reports by manufacturer, person authorized by manufacturer and (or) accredited testing laboratory;

i) document confirming characteristics of materials and components (if any);

j) certificates of conformity, declarations of conformity or test reports for materials, components (if any);

k) list of standards specified in Section V of these technical regulations, which have been applied during equipment manufacturing (fabrication) (if used by the manufacturer);

l) documents confirming qualifications of specialists and manufacturer's personnel;

m) other documents directly or indirectly confirming equipment compliance with the requirements of these technical regulations (if any).

1. **Drawings (main drawing in Russian)**
2. **Operational manual (in Russian)**
3 **Other Critical documents in Russian language**

Union Authorities

http://www.eurasiancommission.org/en – the **official website** of the Eurasian Economic Commission (Commission of the Customs Union).Customs Union Commission . Here is a database of the Customs Union and the Eurasian Economic Commission, containing legal documents in the field of customs regulations, the Customs Code, the Commission decisions, technical regulations and their projects, as well as other documents.

http://www.tks.ru – Custom Computer Service. It contains news of customs legislation, **a lot of information about of handling customs questions, customs clearance of goods, rules of filled out customs declaration**, and much, much more.

http://www.gost.ru/wps/portal/pages.en.Main – official website of the Federal Agency for **Technical Regulation** and Metrology (Rosstandart). Here are the database of technical regulation, standardization, conformity assessment, metrology, including standards and their projects, decisions of the Technical Committees, etc.

http://www.gosnadzor.ru - official site of the **Federal Service for Ecological, Technological and Nuclear Supervision** (Rostekhnadzor). Here are the database in the field of industrial safety, including registers, projects of laws, etc.

http://www.fsa.gov.ru - official site of the **Federal Service for Accreditation**

Equipment classification by hazard categories
ANNEX No.1

Categories of steam, water heating boilers and fire-heated vessels

Category of equipment	Capacity of equipment (m^3)	Product of maximum allowable operating pressure multiplied by capacity (MPa • m^3)	Maximum allowable operating pressure (MPa)
1	2	3	4
1st	Above 0.002 up to 0.1 inclusive	Up to 0.005 inclusive	Above 0.05
2nd	Above 0.002 up to 0.4 inclusive	Above 0.005 up to 0.02 inclusive	Above 0.05 up to 3.2 inclusive
3d	Above 0.002 up to 1 inclusive	Above 0.02 up to 0.3 inclusive	Above 0.05 up to 3.2 inclusive
4th	Above 0.002 up to 0.01 inclusive	Not rated	Above 3.2
	Above 0.01 up to 1 inclusive	Above 0.3	Above 0.3
	Above 1	Not rated	Above 0.05

Safety requirements to equipment design (engineering) and manufacture (fabrication)
ANNEX No. 2

REGIMENTED LIST OF REQUIREMENTS

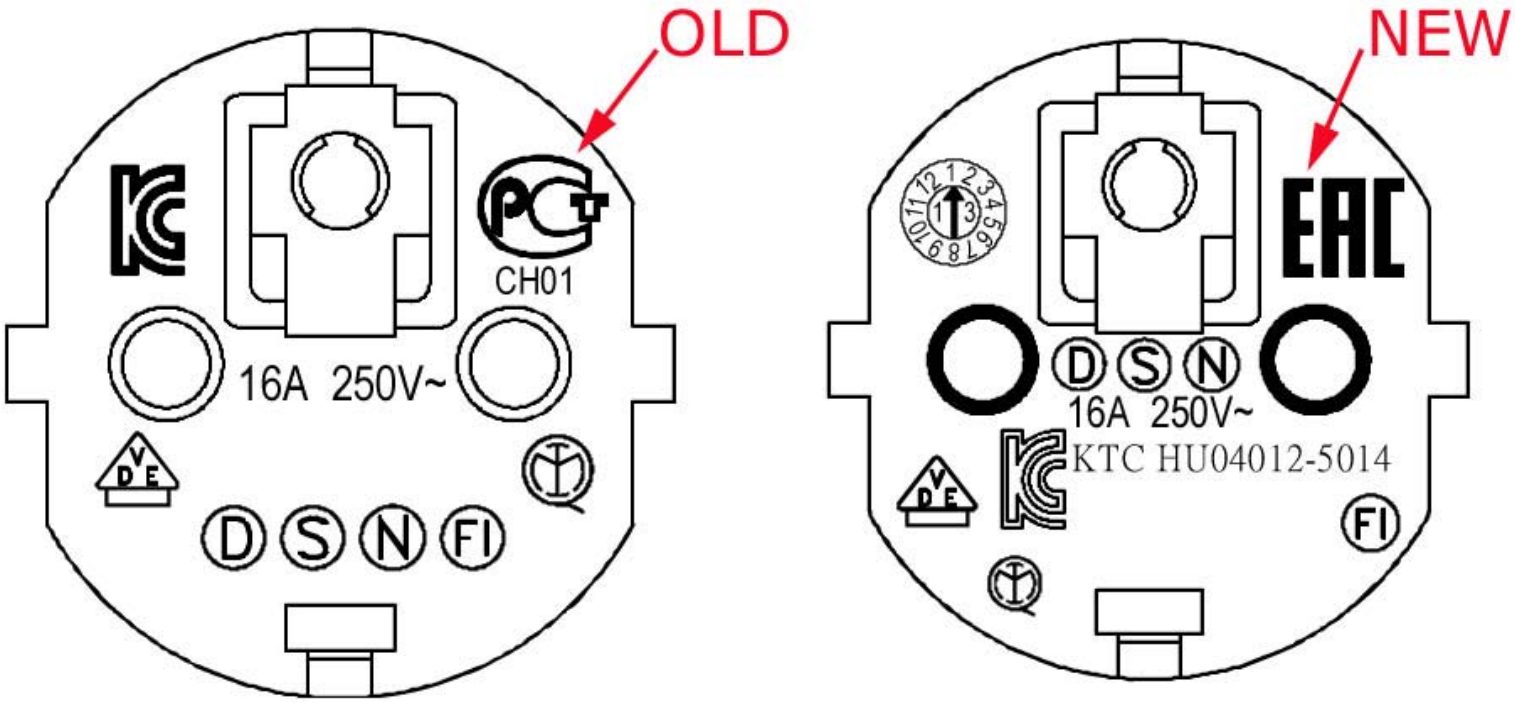
- **Total – 117 lists of requirements covered in 18 pages**
- **Each of these are to be assessed for applicability**
- **Justification required for non-applicable requirements**

Requirements to distinctive coloring and identification information
- ANNEX No 3

I. Cylinders

Name of gas	Cylinder painting	Inscription text	Inscription color	Stripe color
1	2	3	4	5
Nitrogen	Black	Nitrogen	Yellow	Brown
Ammonia	Yellow	Ammonia	Black	-
Crude Argon	Black	Crude Argon	White	White
Industrial Argon	Black	Industrial Argon	Blue	Blue
Pure Argon	Gray	Pure Argon	Green	Green
Acetylene	White	Acetylene	Red	-
Butylene	Red	Butylene	Yellow	Black
Oil & Gas	Gray	Oil & Gas	Red	-
Butane	Red	Butane	White	-
Hydrogen	Dark green	Hydrogen	Red	-
Air	Black	Compressed air	White	-
Helium	Brown	Helium	White	-
Nitrous Oxide	Gray	Nitrous Oxide	Black	-
Oxygen	Light blue	Oxygen	Black	-
Medical Oxygen	Light blue	Medical Oxygen	Black	-
Hydrogen Sulfide	White	Hydrogen Sulfide	Red	Red
Sulfur Dioxide	Black	Sulfur Dioxide	White	Yellow
Carbon Dioxide	Black	Carbon Dioxide	Yellow	-
Phosgene	Protective	-	-	Red
Freon-11	Aluminum	Freon-11	Black	Blue
Freon-12	Aluminum	Freon-12	Black	-
Freon-13	Aluminum	Freon-13	Black	2 red stripes
Freon-22	Aluminum	Freon-22	Black	2 yellow stripes
Chlorine	Protective	-	-	Green
Cyclopropane	Orange	Cyclopropane	Black	-
Ethylene	Purple	Ethylene	Red	-
All other flammable gases	Red	Name of gas	White	-
All other non-flammable gases	Black	Name of gas	Yellow	-

Compliance Marking



- ANNEXURE -

ASME Vs EN14335

http://ec.europa.eu/growth/sectors/pressure-gas/pressure-equipment/directive_en

Ref. Ares(2015)2557092 - 18/06/2015

Summary

"Comparative Study on Pressure Equipment Standards"

European Commission, DG Enterprise, Contract N° FIF.20030114

Contractors: TÜV Austria (Austria), CEC (Italy)

July 2004

Refer to the above webpage for complete study details

ASME Vs EN14335

5. Summary and Conclusions

a) The project has considered application of the new harmonised standard EN 13445 and the ASME VIII design procedures to a set of 9 example cases which covered a wide range of pressure vessel types, designs, materials and fabrications.

b) The overall basis for comparison was one of economic cost. A procedure was used which allowed fair comparison of three routes: EN 13445, ASME + U-stamp, ASME + PED. While the consortium performed the design, several EU manufacturers were involved in the project to assess the costs.

c) The following table summarizes the mean values of the relative costs, i.e. mean of the relative costs quoted by the different manufactures, for each vessel and code route considered:

d) Overall it is demonstrated that EN 13445 offers a technically and economically competitive design route for unfired pressure vessels. In 6 / 7 (depending on the type of the courses in the case of the hydrogen reactor) out of 9 examples the EN design route was the most economic. It should be noted however that in some cases the reported cost differences for different manufactures are larger than the cost differences resulting from the application of the various codes.

e) Specific factors affecting costs were: Material costs are frequently greater using the ASME code. In some cases, savings attributable to lower material costs with EN 13445 are partly offset by additional costs of weld testing and NDT when compared with ASME requirements. PWHT costs are frequently greater for the ASME designs, since the PWHT requirements depend on the wall thicknesses. For the two standard refinery heat exchangers no notable cost differences are reported if TEMA requirements are considered for all routes.

For more information

Refer to the document in the webpage

http://ec.europa.eu/growth/sectors/pressure-gas/pressure-equipment/directive_en

THANK YOU

End of Presentation