



SPECIFICITIES OF SUPERVISION OF OVERPRESSURIZED EQUIPMENT

V. Chernyshev

Deputy Head

Department of State Construction Supervision

Federal Environmental, Industrial and Nuclear Supervision Service

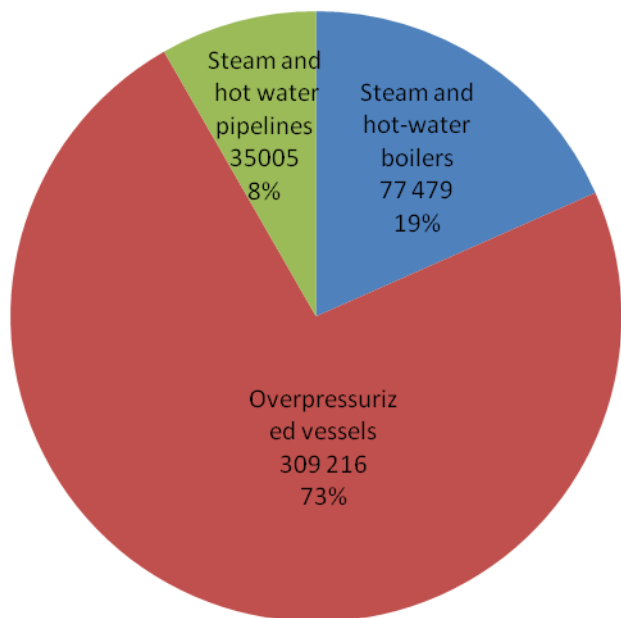


General Information about the Supervised Equipment

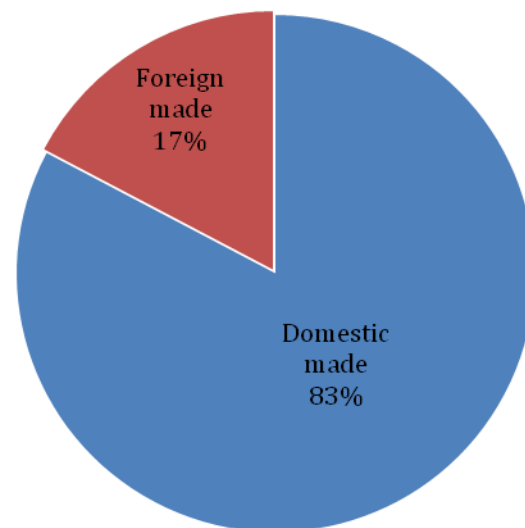
Rostekhnadzor together with its territorial departments supervises 18178 organizations (legal entities) that exercise activities in the field of industrial safety of boiler facilities.

The number of pieces of equipment utilized at the supervised enterprises and organizations is more than 405 000, of which: approx. 71 000 boilers, including 6867 foreign made; more than 302 000 overpressurized vessels (of which 5817 with quick disconnect caps), including 60043 foreign made (of which 1450 with quick disconnect caps); more than 34 000 steam and hot water pipelines of total length exceeding 12 500 km; 1731 gas-filling stations and vessel testing sites.

Types of equipment



423413 pieces of technical equipments



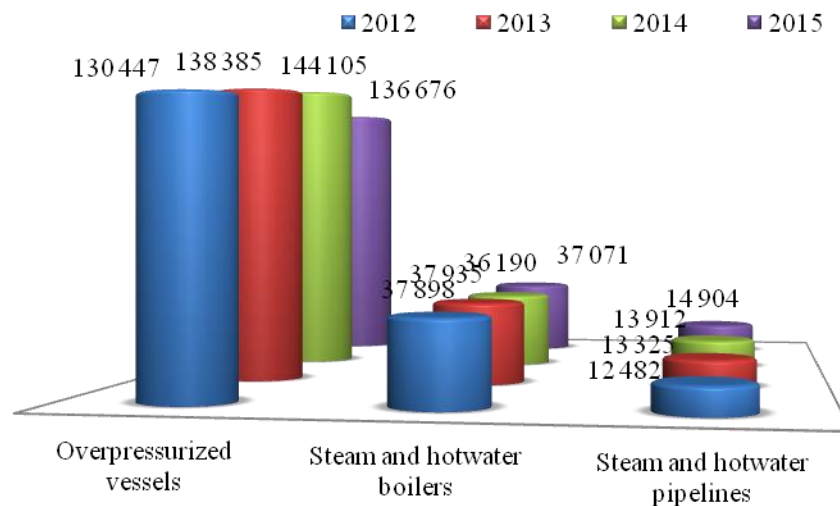


Time History and the Operation Time of Supervised Equipment

Equipment description	2012	2013	2014	2015
Steam and hot-water boilers	73 388	72 936	71 016	77 49
Overpressurized vessels	276 510	293 064	302 037	309 216
Steam and hot-water pipelines	31 167	32 659	34 068	35 005
Gas-filling stations and vessel testing sites	1 805	1 754	1 731	1 713
Total:	382 870	400 413	408 852	423 413

Equipment type	Number of pieces	Number of spent life pieces	Average wear percentage%
Steam and hot-water boilers	77 479	37071	47,8
Overpressurized vessels	309 216	136676	44,2
Steam and hot-water pipelines	35 005	14904	42,6

Time history of the number of pieces of equipment of spent design life



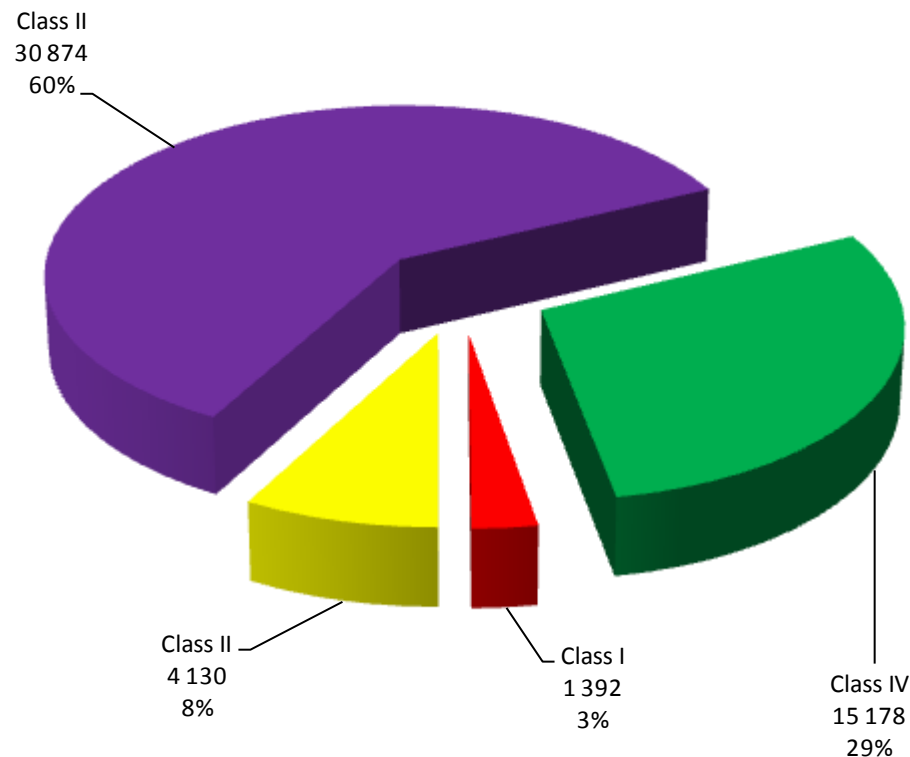
The main cause of decrease in industrial safety in the operation of overpressurized equipment is a huge number of pieces of equipment in operation that have spent their design life set by the manufacturer



Hazard Classes of HPFs Following Re-registration

Amendments to the legislation in the field of industrial safety as regards the HPF classification and finding new principles of risk-based enforcement of industrial safety requirements imposed on operating organizations have resulted in a situation where, following re-registration of HPFs that utilize overpressurized equipment, 13 289 facilities attributed to hazard Class IV, about 26 874 facilities of class III supply the population and socially-significant facilities with heat or include equipment that operates under 1,6 MPa and more or under environment temperature 250°C and more, 3 772 facilities attributed to hazard Class II and 1 373 to Class I and include overpressurized equipment.

HPFs with over-pressurized equipment



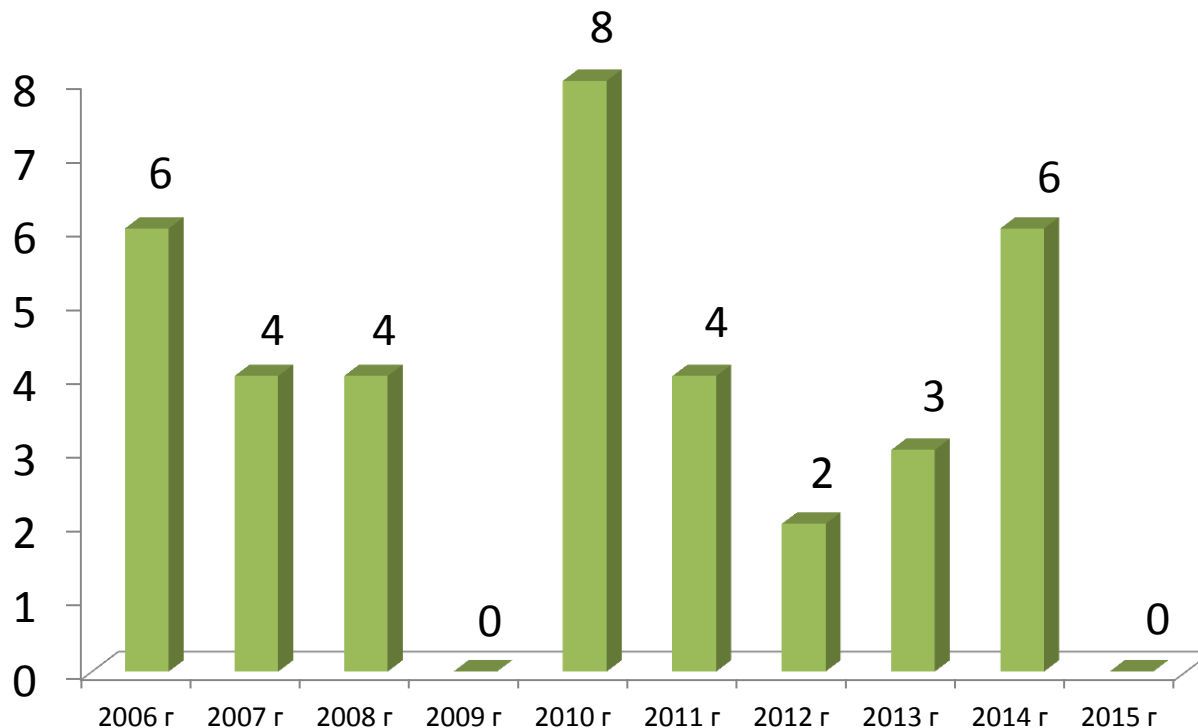


Accident and Injury Rate in the Operation of Boiler Facilities

Based on the reported data, analysis of accident and injury rate in the operation of overpressurized facilities has been conducted over the period 2006 through 2015.

The results show that during the recent decade there occurred 37 accidents and 57 fatal injuries.

Accident time history in the operation of overpressurized equipment

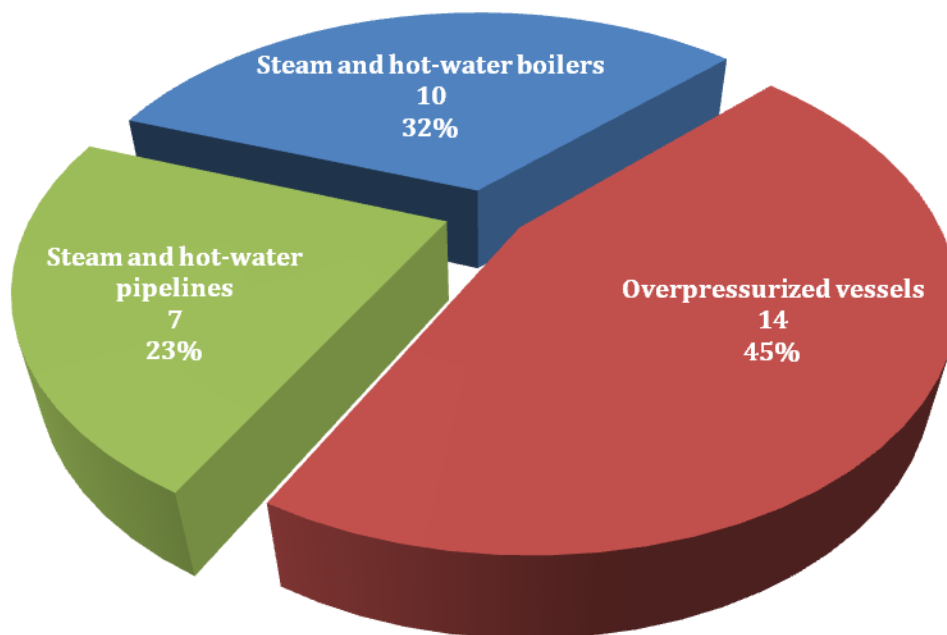




Accident and Injury Rate in the Operation of Boiler Facilities

Based on the reported data, the majority of accidents over 2006-2015 (16 accidents) occurred in the operation of vessels that work under gas (steam) pressure and fluid (including toxic and explosive/flammable ones) pressure

Technical device type distribution of accidents

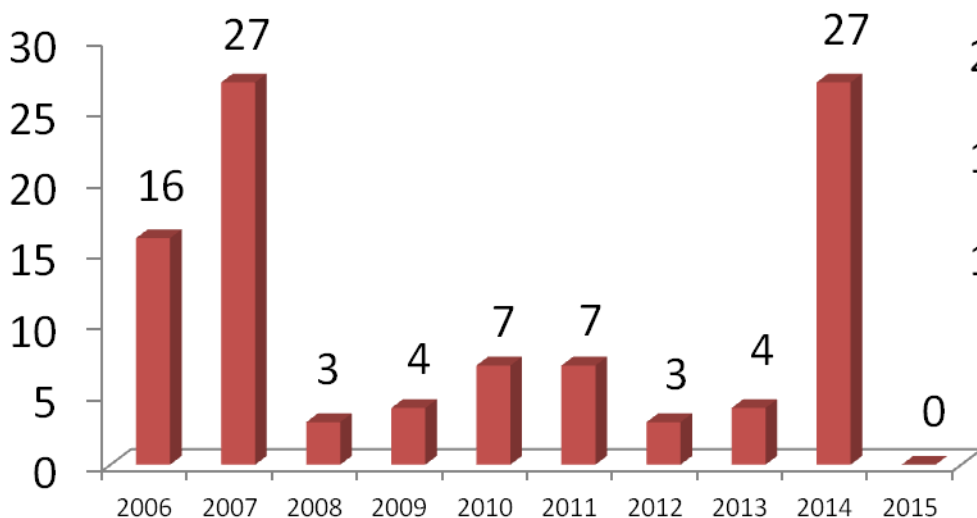




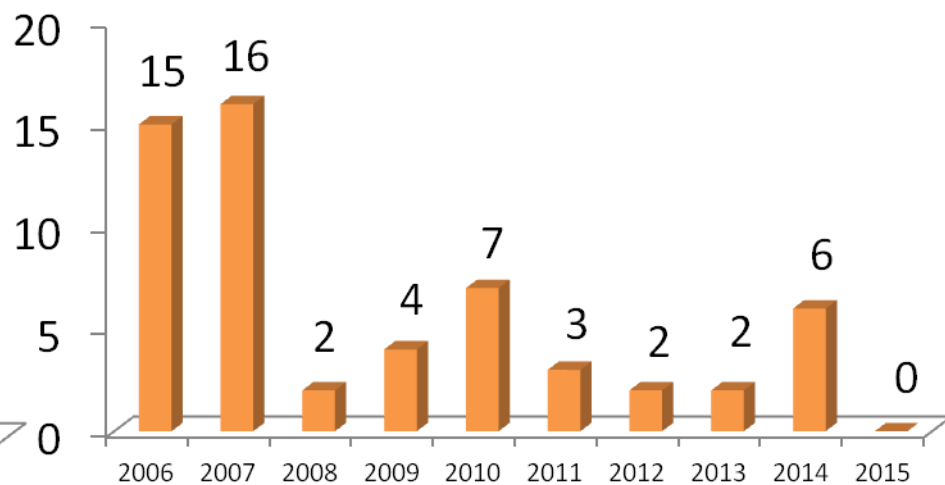
Accident and Injury Rate in the Operation of Boiler Facilities

Totally, over 2005-2014 incidents resulted in injuries of 109 people among which 66 were fatal

General time history of injuries in the operation of overpressurized equipment



Time history of fatal injuries in the operation of overpressurized equipment



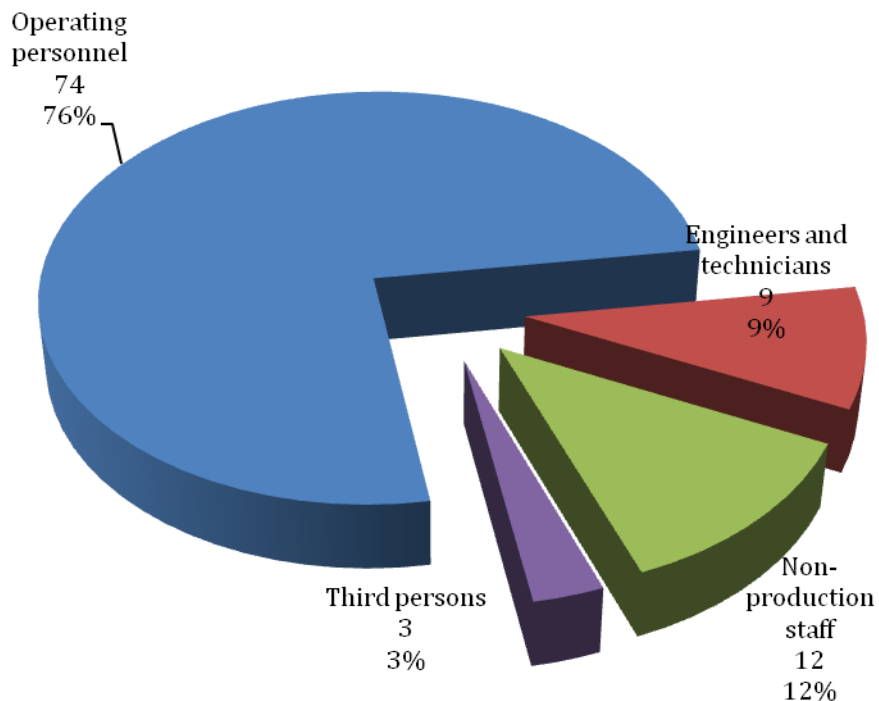


Accident and Injury Rate in the Operation of Boiler Facilities

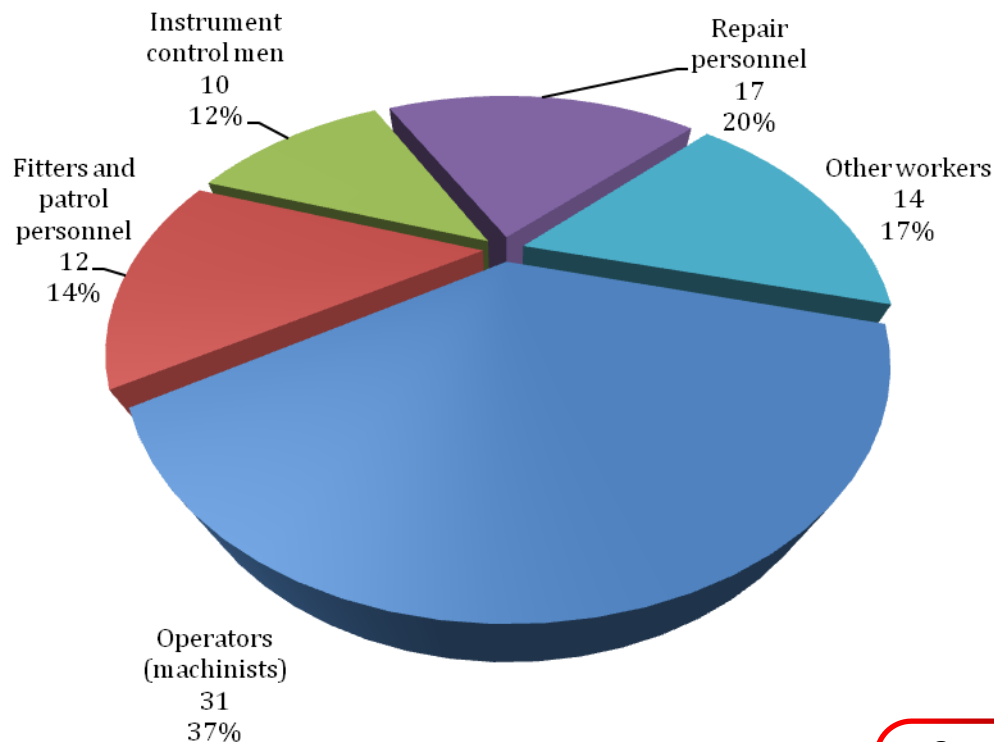
Most frequently, incidents resulted from operation of overpressurized equipment injure the personnel who operate such equipment (76% of total injured).

More than a third of the injured in the incidents (35% of total injured personnel in the incidents) are boiler operators (machinists) and nearly a quarter (23%) are repair personnel.

**Categories of injured personnel
over 2006-2015**



Types of injured personnel over 2006-2015



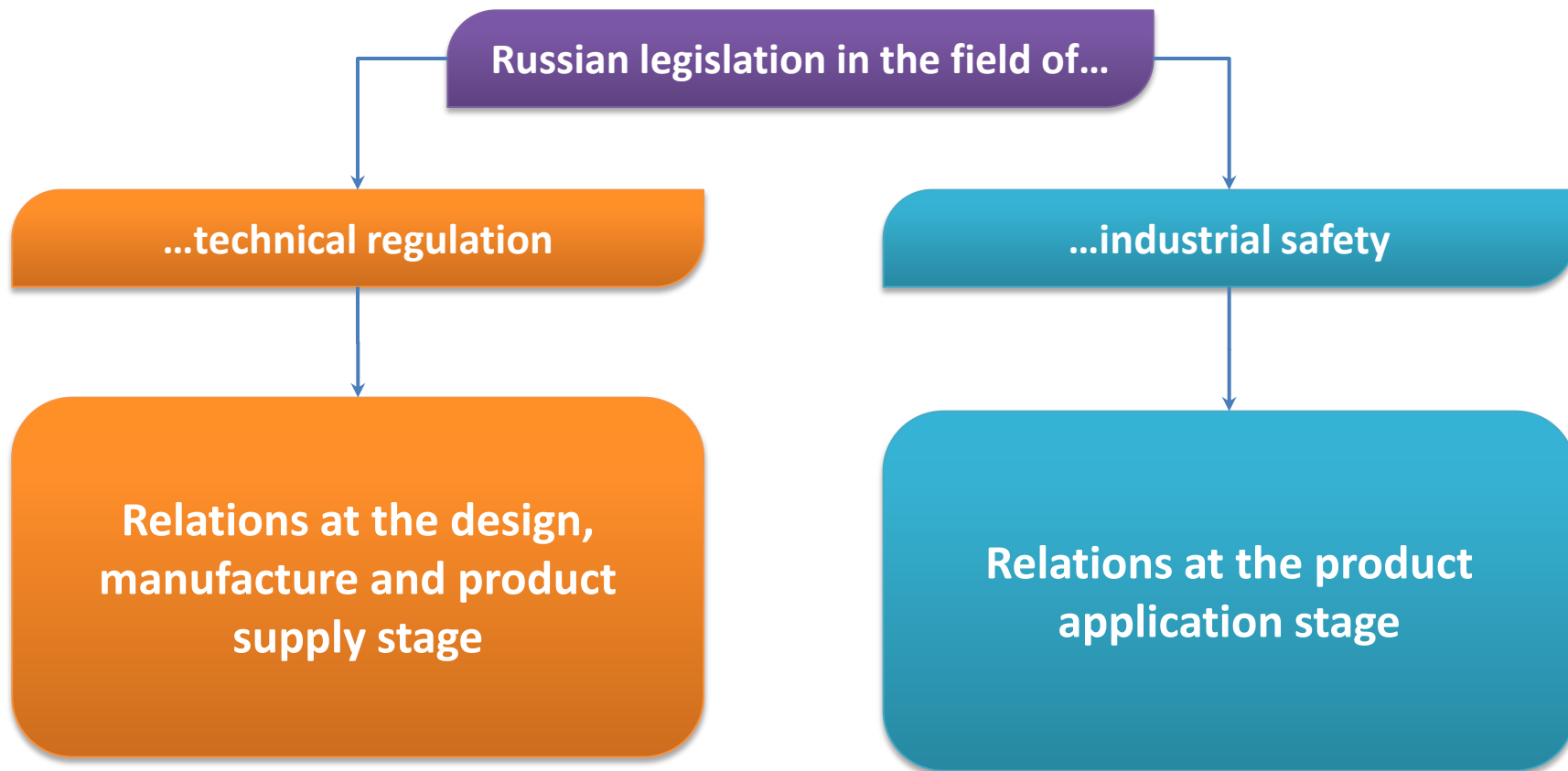


Regulations Applied until Entering into Force of TRCU 032/2013 and Federal Codes and Standards for Overpressurized Equipment

Regulations posing mandatory requirements to all stages of the life-cycle (design, production, installation, repair, check-out and operation) of technical devices, i.e. overpressurized equipment $P > 0.07$ MPa: for gaseous environment and water steam; water under temperature $t > 115^{\circ}\text{C}$; other fluids under temperature above the saturation temperature and 0.07 MPa

Steam and hot-water boilers and etc.	Rule for design and safe operation of steam and hot-water boilers PB 10-574-03, Rule for design and safe operation of electric boilers and electric boiler houses PB 10-575-03
Steam and hot-water pipelines	Rule for design and safe operation of steam and hot-water pipelines PB 10-573-03
Vessels	Rule for design and safe operation of overpressurized vessels PB 03-576-03
Single seat medical-purpose pressure chambers	Rule for design and safe operation of overpressurized vessels PB 03-576-03, GOST R 51316-99 Stationary single-seat medical purpose pressure vessels. General technical requirements.







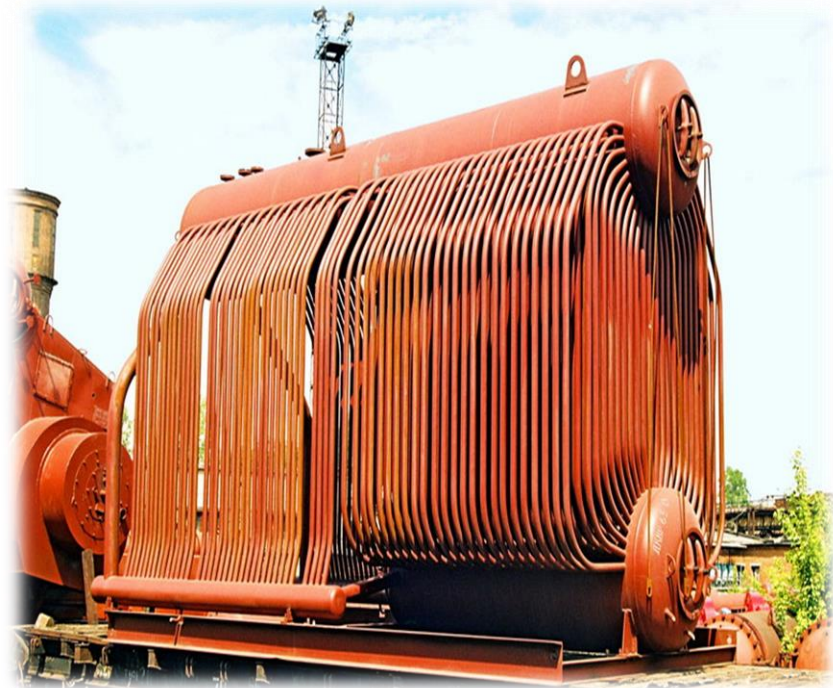
TRCU On Safety of Overpressurized Equipment (TRCU 032/2013) of 01 February 2014

Establishes safety requirements to equipment ($P > 0,05 \text{ MPa}$, $t > 110^\circ\text{C}$ with account to the scope identified in Clauses 2 and 3 of TRCU 032/2013) in the development (design) and manufacture (production) as well as requirements to labeling of equipment in order to protect human life and health, property and to prevent actions that can misinform consumers

International agreement

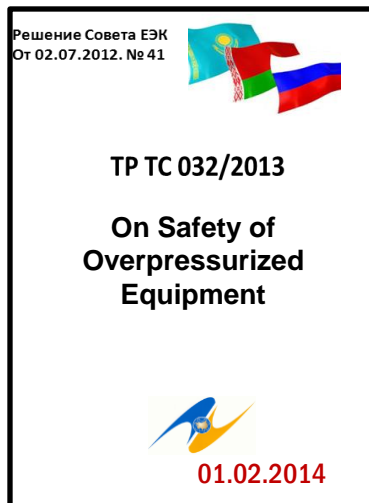


- development (design);
- manufacture (production);
- labeling
- prevention of actions that can misinform consumers





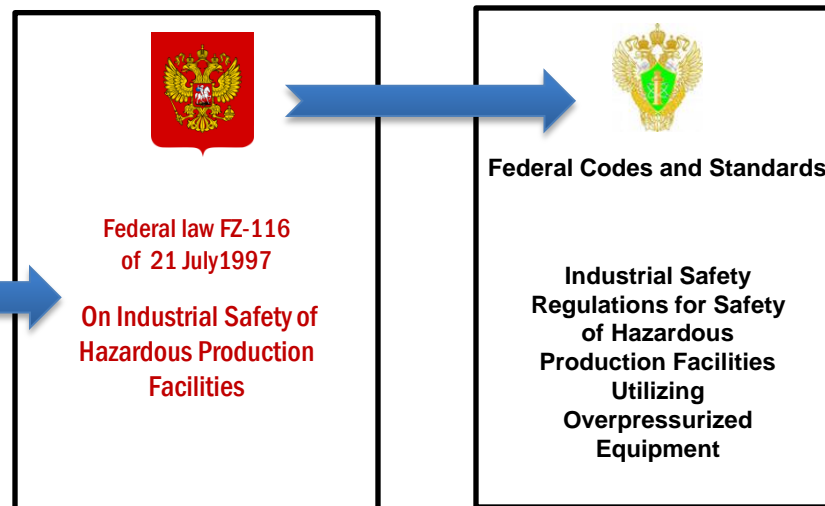
TRCU On Safety of Overpressurized Equipment (TRCU 032/2013) of 01 February 2014



Establishes integrated requirements to OE (products) mandatory for implementation and execution throughout the customs territory of the Customs Union with a view to ensuring free movement of the equipment, which is **first time put to circulation** and designed for application at the customs territory of the Customs Union.

If the equipment is subject to other adopted technical regulations of the Customs Union, which pose requirements to it, such equipment shall also comply with these technical regulations of the Customs Union.

Clause 34 TRCU 032/2013: The rules for operation of overpressurized equipment shall be established by the legislation of the Member-States of the Customs Union





Federal Codes and Standards for Industrial Safety ‘Industrial Safety Regulations for safety of Hazardous Production Facilities Utilizing Overpressurized Equipment’ (FCS OE)

Approved by Order of Rostekhnadzor No. 116 of 25 March 2014, registered 19 May 2014 in Ministry of Justice of Russia, №32326, published 22 September 2014 and came into force on 22 December 2014

I. General Provisions of FCS OE

The Scope and Purpose

The FCS are aimed at prevention of accidents, incidents, industrial injuries at facilities when using equipment of overpressurized (more than 0,07 MPa):

- a) steam, gas (in gaseous or liquid state);
- b) water under temperature exceeding 115 °C;
- c) other fluids under temperature exceeding the boiling point under overpressure (0,07 MPa).



Development of processes
 Technical upgrade of HPFs
 Siting, Installing and reconstruction (modernizing)
 Check-out
 Operation
 Certification testing, technical diagnosis, industrial safety review

Boilers, vessels, pipelines,
 tanks, barrels, tankers,
 pressure chambers

A list of devices, the FCS are not applicable to, is provided



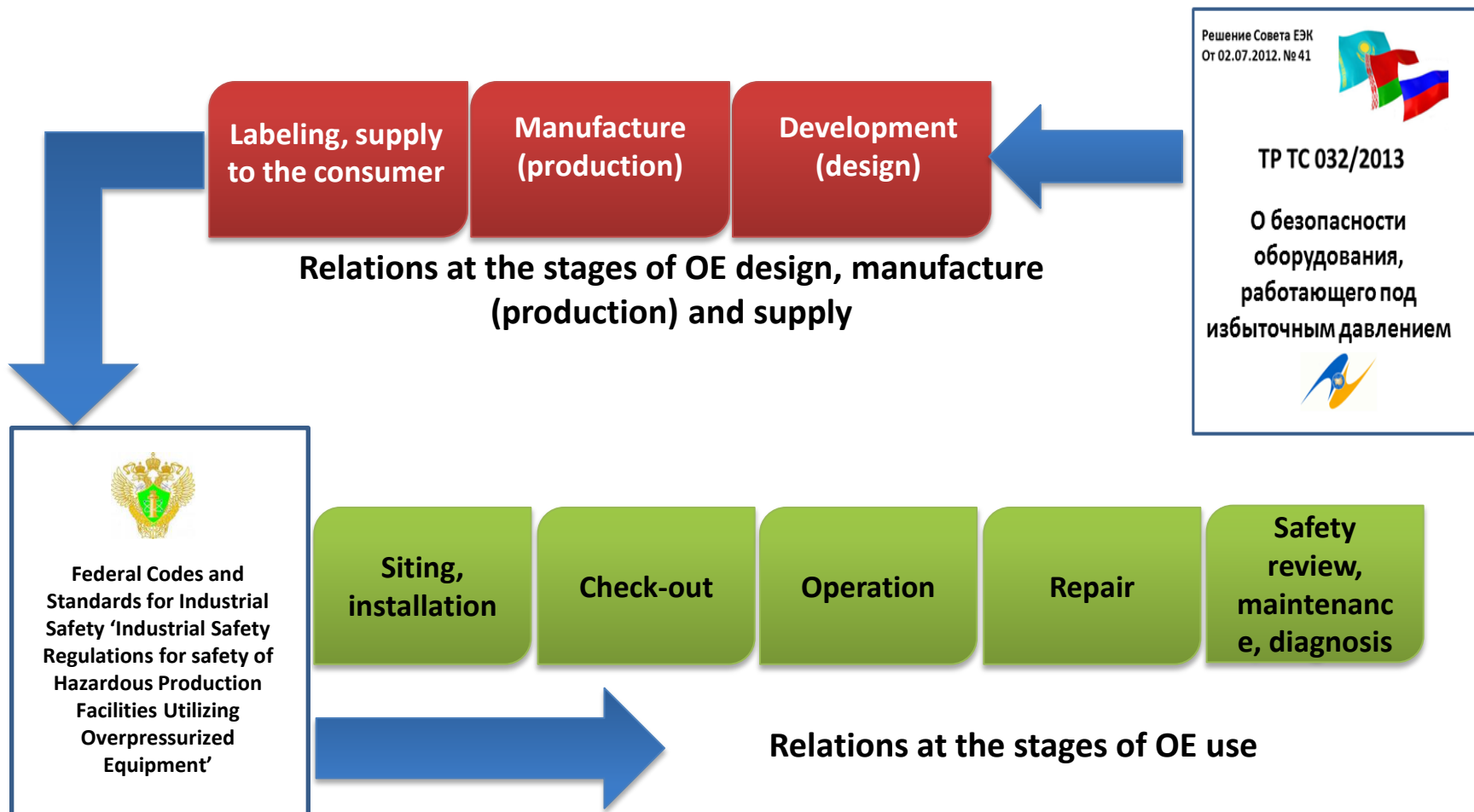
Matching the Scopes of the Regulations Before and After TRCU 032/2013 and FCS OE Came into Force

Regulatory documents pursuant to which requirements to technical devices at stages of the life cycle have been regulated (design, manufacture, installation, check-out, operation and repair)

Type of the technical device	Before TRCU 032/2013 and FCS OE came into force			After TRCU 032/2013 and FCS OE came into force	
	Design, manufacture	Installation, check-out	Operation	Design, manufacture	Installation, check-out, operation and repair
Boilers	Rule for design and safe operation of steam and hot-water boilers PB 10-574-03 , Rule for design and safe operation of electric boilers and electric boiler houses PB 10-575-03			TRCU 032/2013 Technical regulation of the Customs Union On Safety of Overpressurized Equipment	FCS Industrial Safety Regulations for Safety of Hazardous Production Facilities Utilizing Overpressurized Equipment
Pipelines	Rule for design and safe operation of steam and hot-water pipelines PB 10-573-03				
Vessels	Rule for design and safe operation of overpressurized vessels PB 03-576-03				
Single seat medical-purpose pressure chambers	Rule for design and safe operation of overpressurized vessels PB 03-576-03 , GOST R 51316-99 Stationary single-seat medical purpose pressure vessels. General technical requirements			FCS Industrial Safety Regulations for Safety of Hazardous Production Facilities Utilizing Overpressurized Equipment	



The Interrelation of Technical Regulatory Requirements in Industrial Safety as Exemplified with OE





TRCU 032/2013

- I. Scope
- II. General definitions
- III. Rules of commercialization
- IV. Ensuring safety of equipment in the development (design) and manufacture (production)
- V. Ensuring compliance with the safety requirements
- VI. Conformity assessment (verification) for the equipment
- VII. Labeling of the equipment with the single commercialization mark at the Customs Union Member-States' market
- VIII. Disclaimer clause

Appendixes:

- Equipment categorization by the hazard class
- Safety requirements to equipment in the development (design) and manufacture (production)
- Requirements to identification painting and information



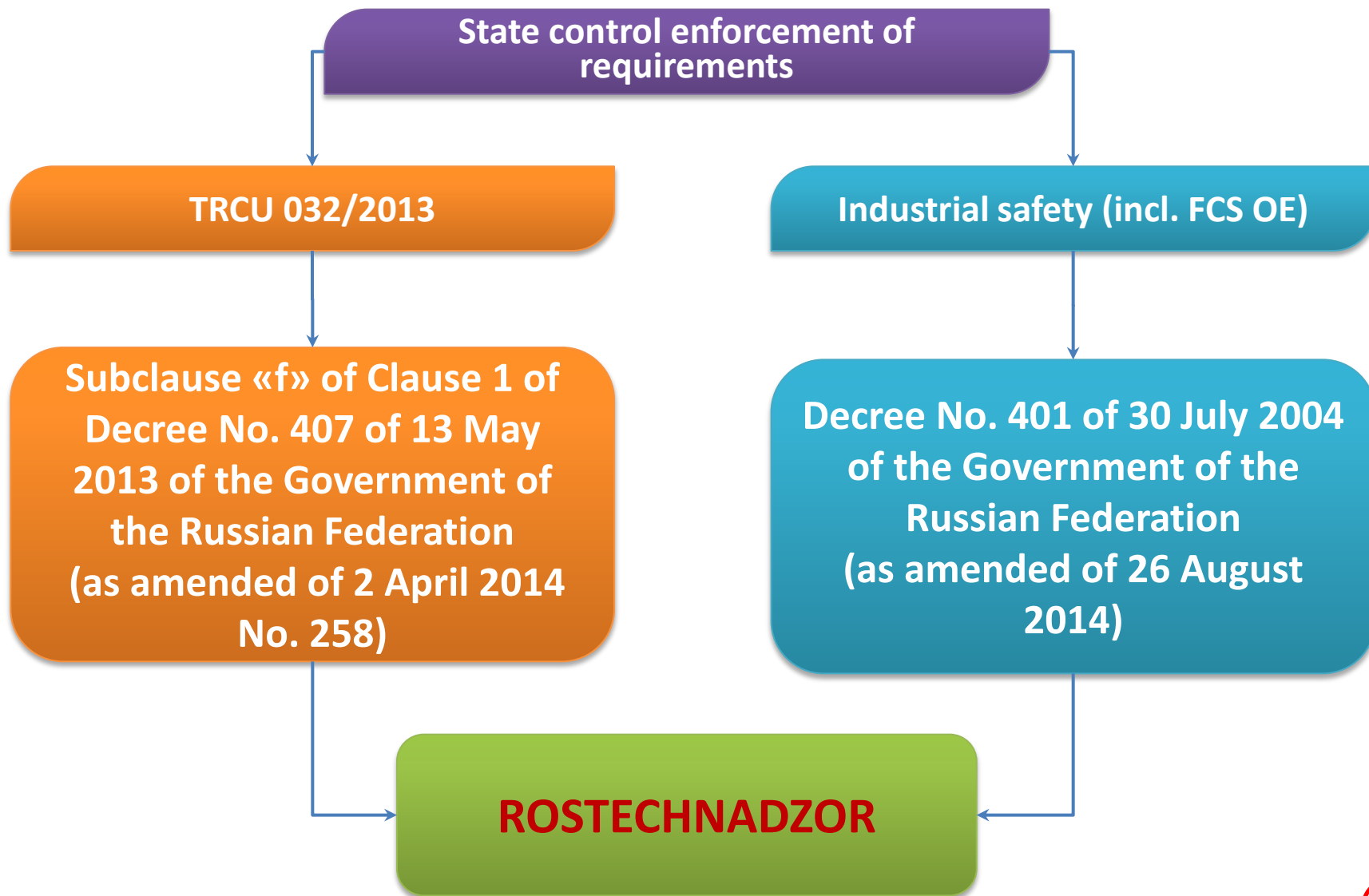
The FCS OE Structure Includes 14 Sections and 6 Appendixes

- . General provisions
- I. Requirements to installation, siting and layout of overpressurized equipment.
- II. Requirements of industrial safety to the technical upgrade of HPFs, installation, repair, reconstruction (modernizing) and check-out of overpressurized equipment.
- IV. Procedure for commissioning, startup and equipment accounting.
- V. Industrial safety requirements to operation of overpressurized equipment
- VI. Certification testing, technical diagnosis and industrial safety review of overpressurized equipment.
- VII. Additional industrial safety requirements to operation of boilers with high-temperature organic and non-organic coolants.
- VIII. Additional industrial safety requirements to operation of recovery boilers.
- X. Additional industrial safety requirements to operation of gas-tube boilers.
- X. Additional industrial safety requirements to operation of electric boilers.
- XI. Additional industrial safety requirements to operation of liquid gas transport tanks and barrels.



FCS OE Appendixes

- **Appendix 1.** Terms and definitions additionally used for the purposes of the FCS OE
- **Appendix 2.** Painting and information on the pipes
- **Appendix 3.** Requirements to quality of feed and boiler water
- **Appendix 4.** Periodicity of the certification testing of vessels in case of lack of direct reference in the service manual (instruction)
- **Appendix 5.** Standards of electric testing of electric devices of electric boilers
- **Appendix 6.** Standards of liquid gas tankage of tanks, barrels and tankers





**Thank you for
attention!**