



TECHPROMARMA  
confidence in safety

# EMERGENCY PROTECTION OF PIPELINES AND EQUIPMENT





## Water Hammer Disasters

### **SAYANO-SHUSHENSKAYA HPP**

RUSSIA – 2009

AFTERMATH: 75 KILLED,  
LOSSES \$550 MILLION



### **OLYMPIC PIPELINE EXPLOSION**

US – 1999

AFTERMATH:  
3 CHILDREN KILLED  
\$112 MILLION SETTLEMENT.



### **THE THREE MILE ISLAND**

US – 1979

AFTERMATH: \$ 3.5 BILLION  
DAMAGES

### **BP'S TEXAS CITY REFINERY**

US – 2005

AFTERMATH:  
15 KILLED, 170 INJURED  
\$70 MILLION DAMAGES



## Water Hammer Disasters

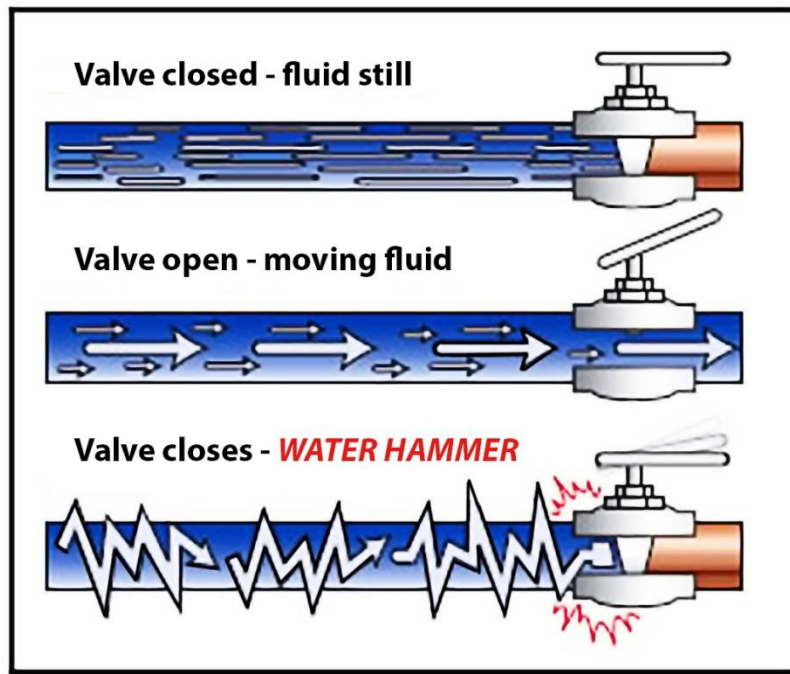
Transients and surges, leading to pipe rupture and equipment collapse are a worldwide problem with enormous consequences.

**Water hammer** is a shock wave that is transmitted through the fluid in a pipe.

In simple words water hammer occurs when a moving fluid suddenly stops or changes direction.

### Consequences:

- fluid loss
- disruption of service
- maintenance
- legal settlements
- environmental disasters
- injuries
- casualties

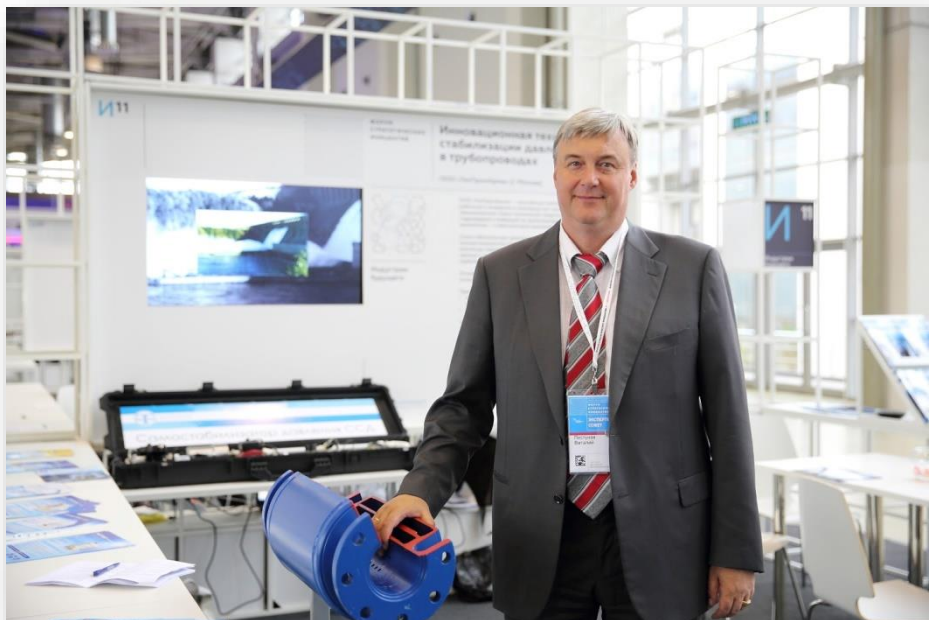




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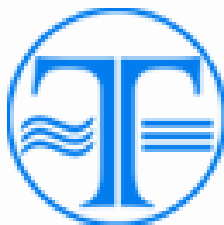
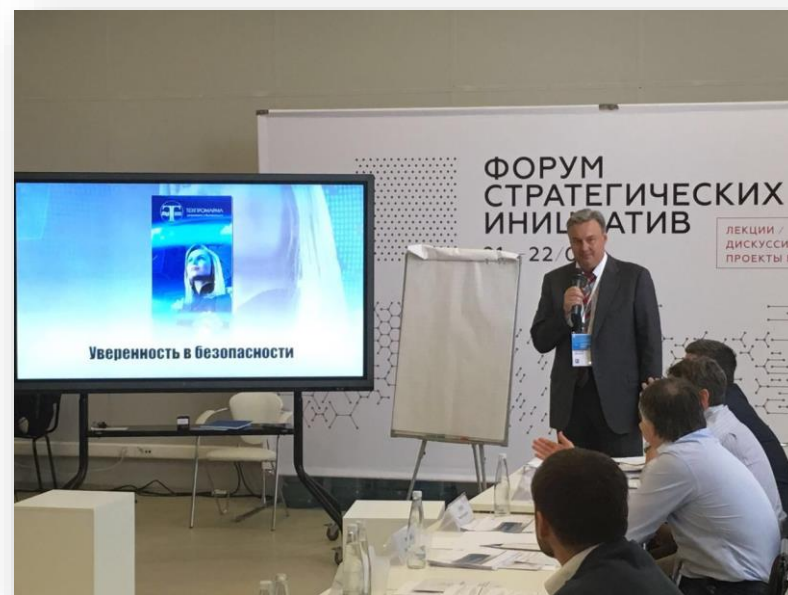
[www.techpromarma.ru](http://www.techpromarma.ru)

E-mail: [tpa@techpromarma.ru](mailto:tpa@techpromarma.ru)



## Vitaly Pestunov

is the founder of the company  
TechPromArma and  
the main developer of the device  
concept  
for damping water hammer  
and pressure pulsations.

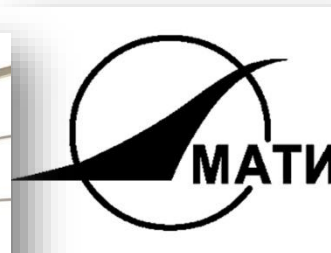




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## OUR TEAM



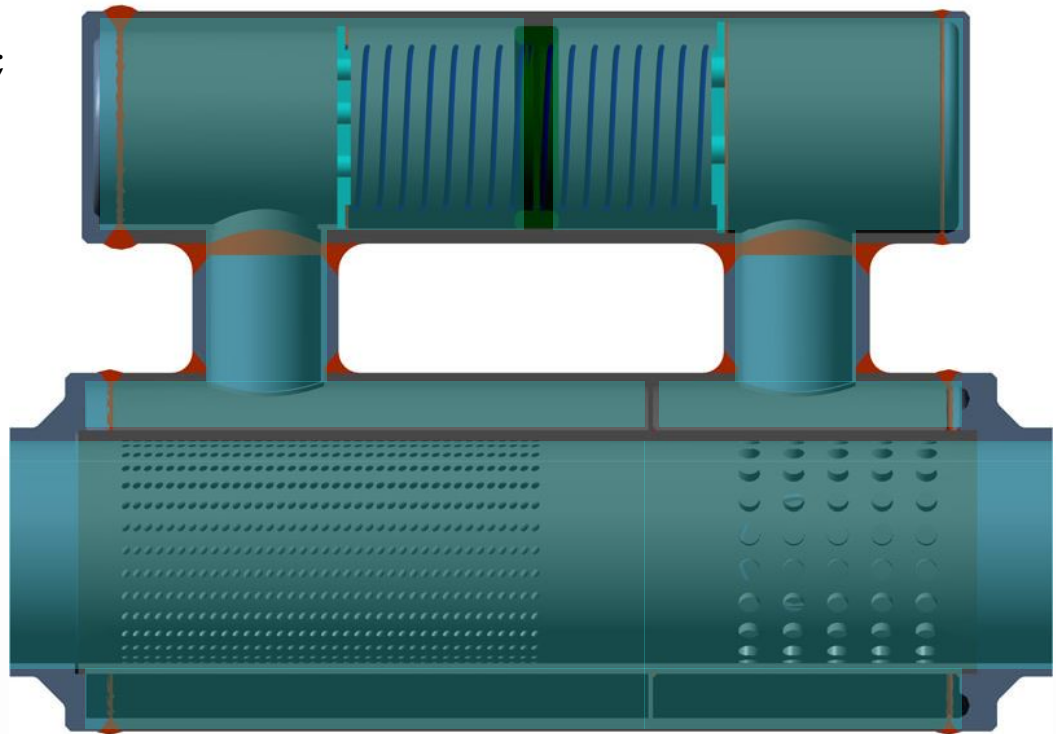


## PRESSURE AUTOSTABILIZER DESIGN

- Central perforated insert;
- Big and small expansion chambers;
- Damping chambers;
- Free movement pistons;

### PRINCIPLES OF OPERATION

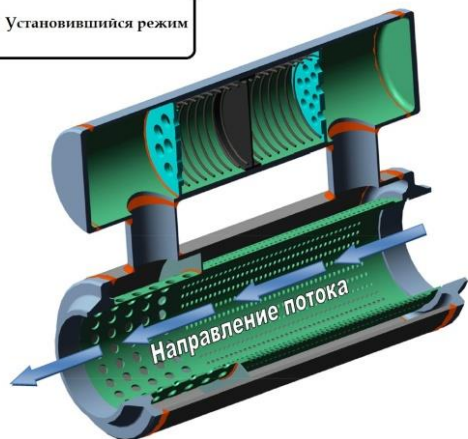
- Water hammer dispersion in special holes;
- Separation of shock wave;
- Medium compressible with free movement pistons – is one of the main damping elements! (auto stabilizing effect);
- Pressure Autostabiliser operation doesn't depend on temperature or working pressure in system.



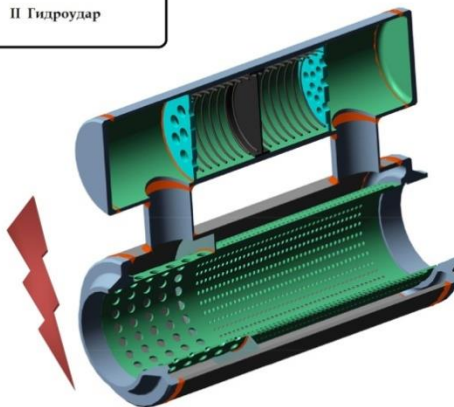


## PRINCIPLES OF OPERATION

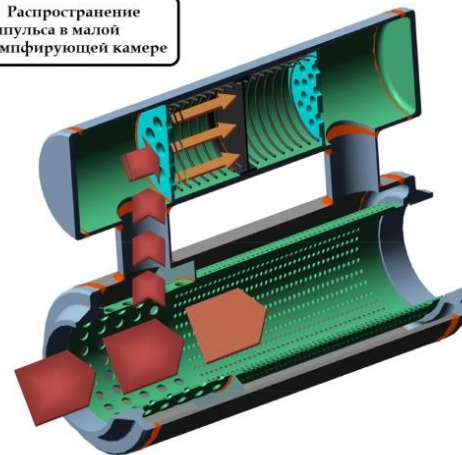
I Установившийся режим



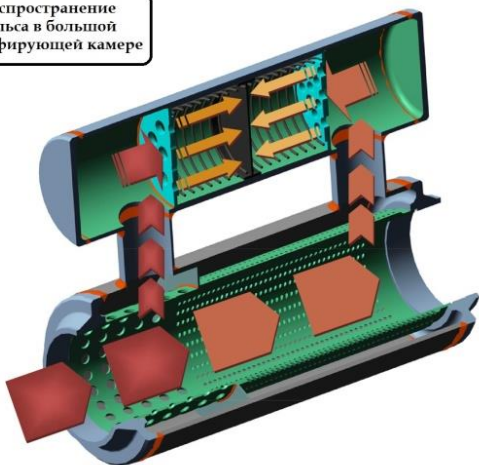
II Гидроудар



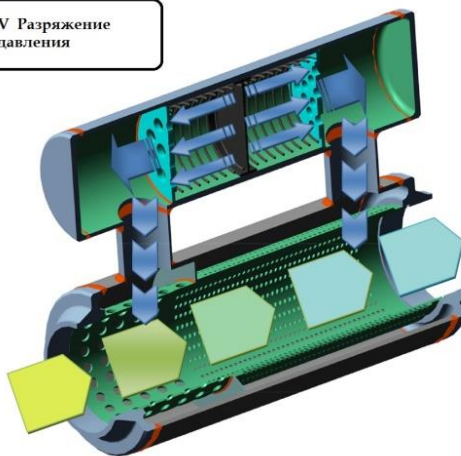
III Распространение импульса в малой демпфирующей камере



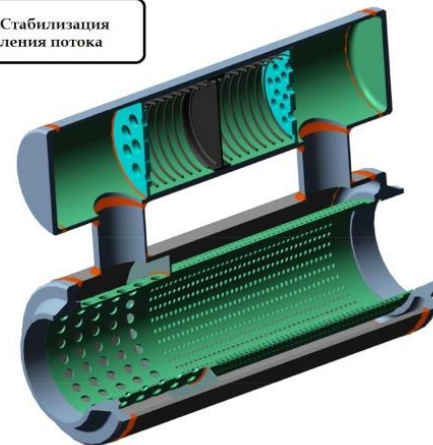
IV Распространение импульса в большой демпфирующей камере



V Разряжение давления



VI Стабилизация давления потока



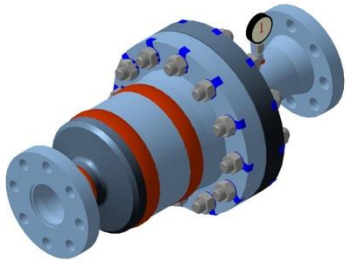
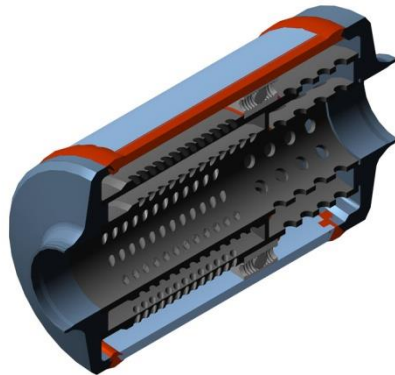


## PRESSURE AUTOSTABILISER



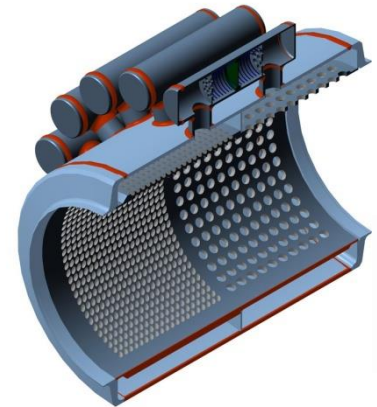
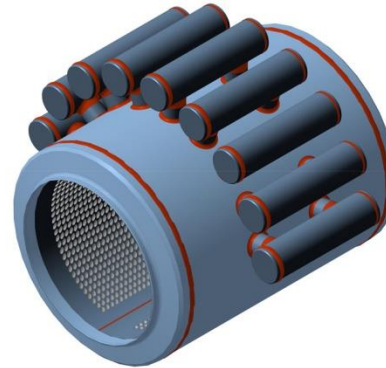
### **TUBE TYPE**

DN: from 6 to 300 mm



### **CHAMBER TYPE**

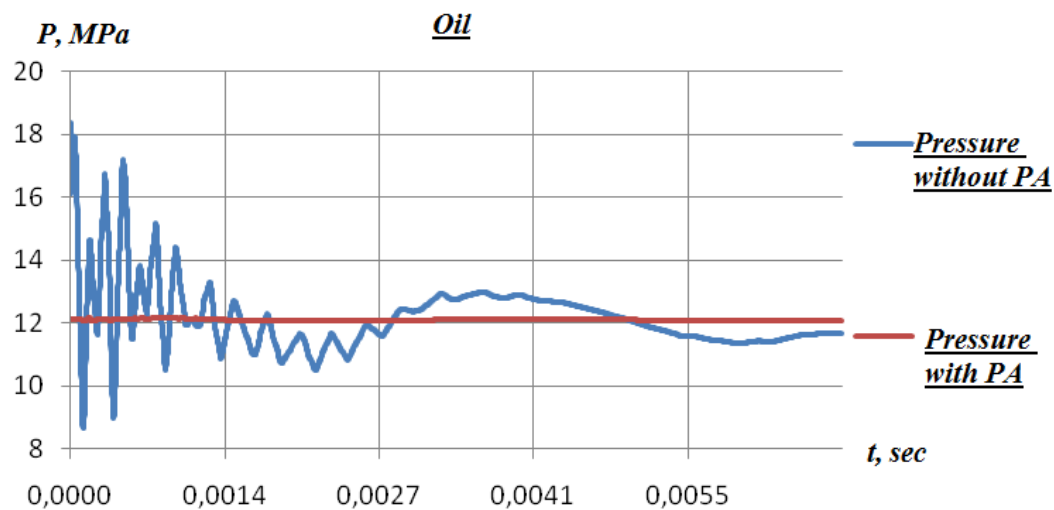
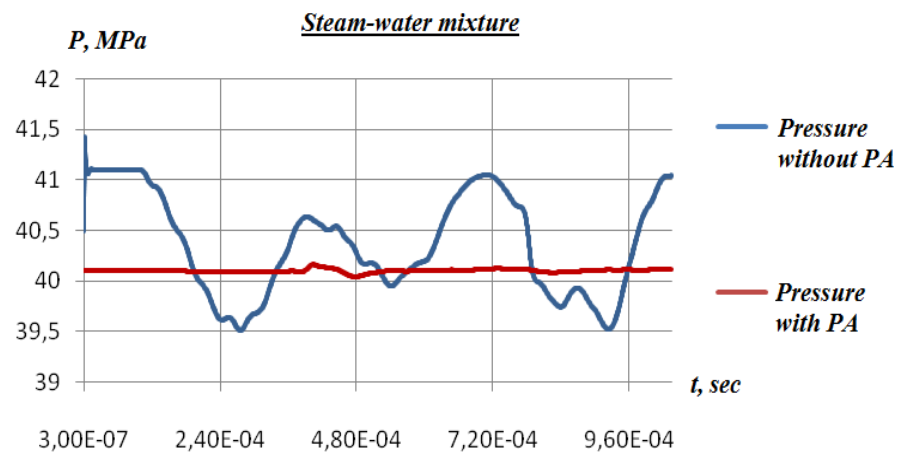
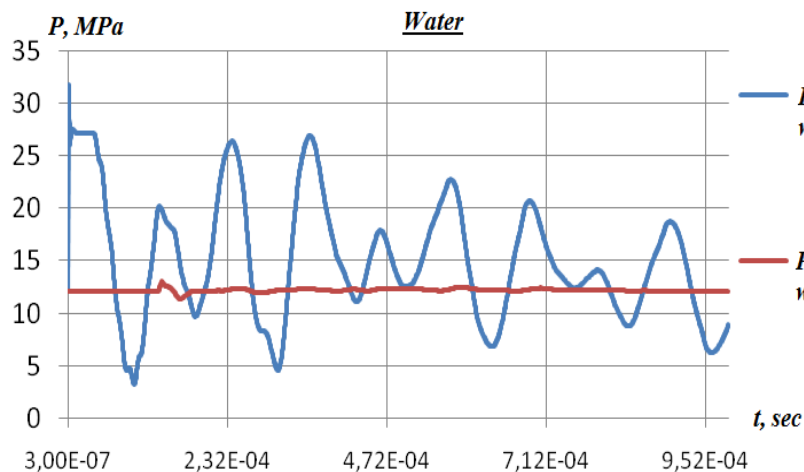
DN: from 100 to 2000 mm



Working Pressure: **up to 40 MPa**;  
Working temperature: **up to 550°C**;  
*According to the customer's request, the design can be changed and the product can be manufactured according to needed technical parameters*

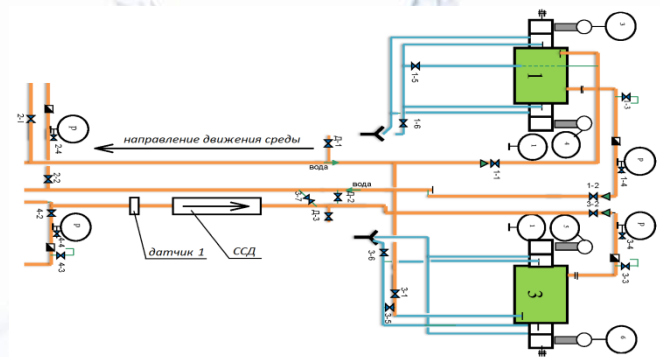
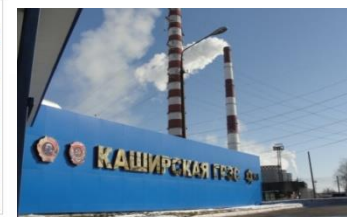
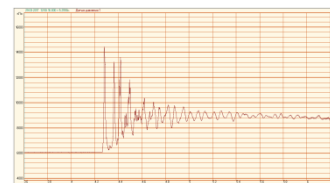
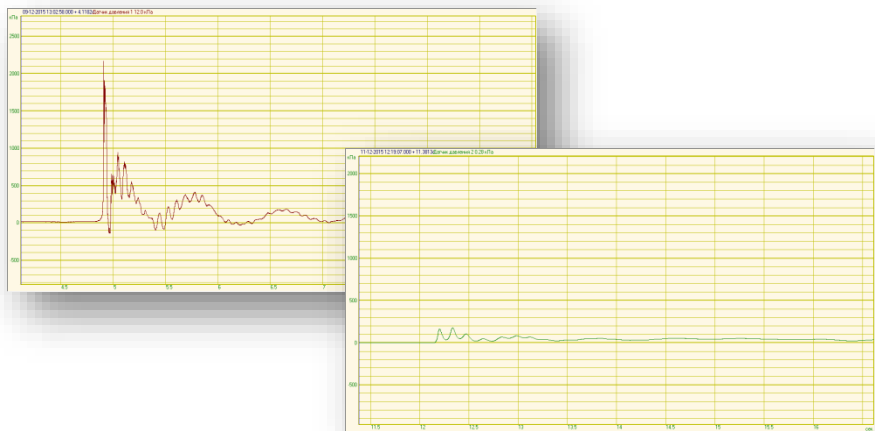


## DIAGRAMS OF PRESSURE SURGES DUE TO VIBRATIONS AND WATER HUMMERS





## EXPERIMENTS, VERIFICATION AND CERTIFICATION





## PROJECT IMPLIMENTATION

Pressure Autostabilizer are extensively used at:

### **Nuclear Power Plants**



Kalinin NPP



Leningrad NPP



Rostov NPP

Smolensk NPP

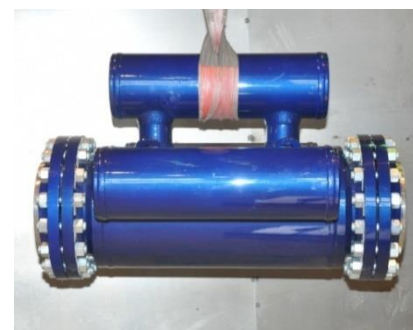


### **Oil and Gas Industry**



LUKOIL facilities

### **Production Facilities**



Raspadskaya coal  
company

### **Municipal water and sewage systems**



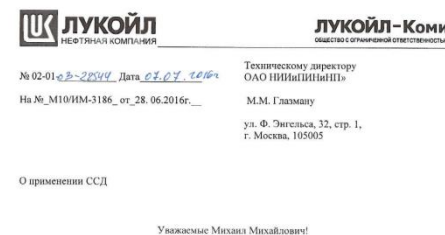


## REFERENCES

### Reference from Borisov CHPP

### Reference from Rostov NPP

### Reference from LUKOIL



Настоящим сообщаем, что в соответствии с договором поставки № 19530 от 21.03.2013г. между РУП «Минскэнерго» и ИУП «Торговый Дом Энергомашкомплект» в адрес филиала «Жодинская ТЭЦ» для объекта «Реконструкция котельного пункта №3 (РК-3) Жодинской ТЭЦ» в г. Борисове со строительством паровой установки. Вспомогательные объекты произведена поставка самостабилизатора давления ССД Ду500 Ру1,6МПа производства ЗАО «Саратовский арматурный завод».

Данный самостабилизатор давления поставлен в срок и в соответствии с договорными обязательствами. Поставленное оборудование поставлено в комплекте с сопроводительной документацией (паспорт завода изготовителя и руководство по монтажу и эксплуатации). По качественным характеристикам претензий не было.

За время эксплуатации ССД на трубопроводах и эффективность ССД сохранилась полностью. В процессе эксплуатации в ССД никаких нарушений к качеству и надежности вышеуказанного оборудования не возникало.

Заместитель директора филиала А.С.Закревский

Уважаемый Дмитрий Анатольевич!  
В ответ на письмо № ИП-17/588 от 21.03.2017 г. сообщаем, что до проведения ПРР-2016 присутствовали колебания в системе ГТР. В период проведения ремонта были установлены самостабилизаторы давления (ССД) 3SC90B01, 3SC91B01, 3SC92B01 в количестве трех штук. После установки ССД колебаний давления в системе ГТР не зафиксировано. ССД полностью соответствует заявленным требованиям.

С уважением

Кравцов  
297225

О работе ССД "25-2-22" ТЦ-2 "Закусов Владимир Анатольевич" 05.04.2017

Первый заместитель генерального директора  
Главный инженер

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г. Усинск, ул. Нефтепрома, 31

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Факс: (82144) 41-3-38

E-mail: uen\_posman@luoil.com



## REPORT ON STRENGTH ASSESSMENT OF PIPELINES

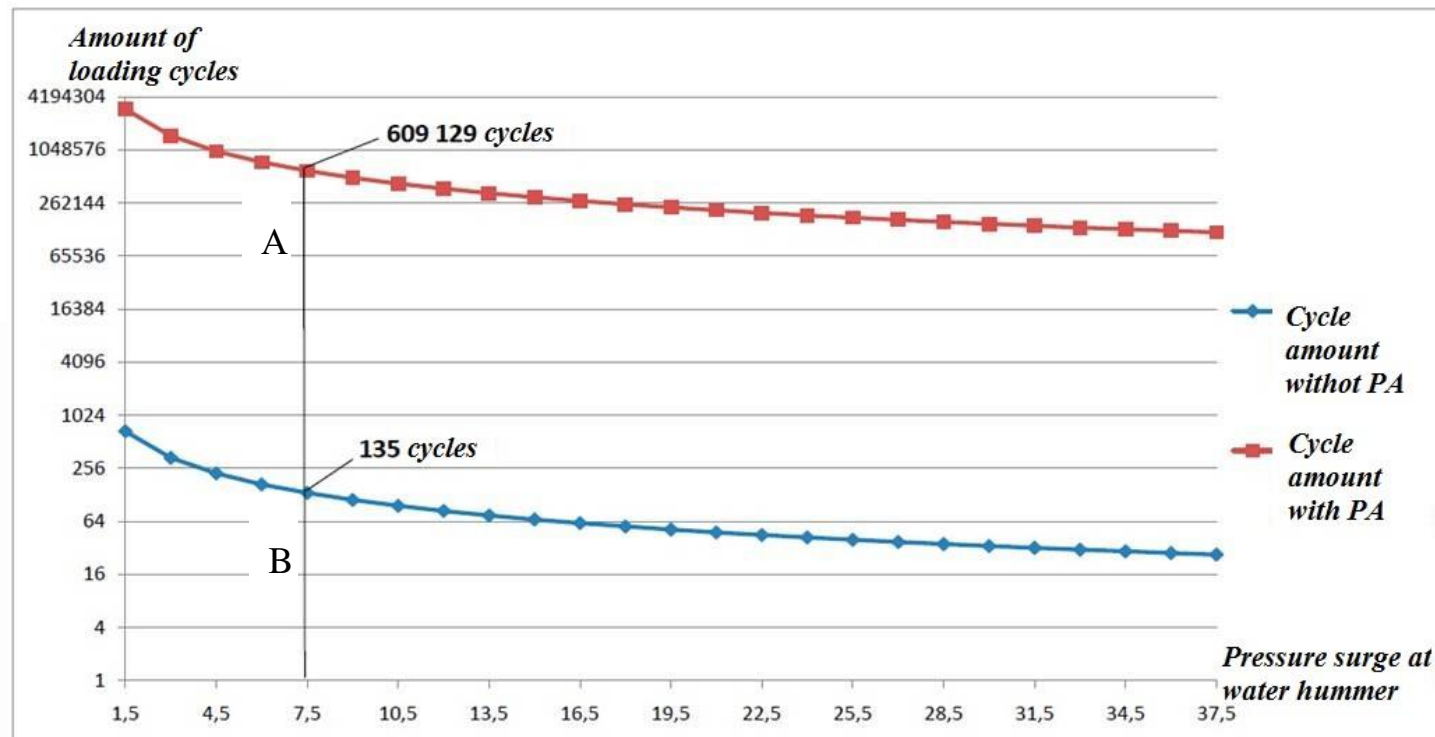
### Cases under consideration

*Pipelines without PA*

**135** Water hummers

*Pipelines with PA*

**609 129** Water hummers



Pipeline with PA withstands **4500 times** more of water hummer cycles!



## PRACTICAL RESULTS OF PRESSURE

### AUTOSTABILIZER OPERATION

- ✓ Reducing accident rate of pipelines and their equipment
- ✓ Increasing residual life operation of pipeline systems 1,5-2 times
- ✓ Reducing direct and indirect costs on preventive, accidental and recovery works

## Application fields of pressure autostabilizer

**At pipelines in different systems such as:**

- Power industry (Nuclear Power Plant, Thermal Power Station, Hydroelectric Power Stations of different types)
- Municipal water and sewage systems
- Oil and Gas industry
- Metallurgical, chemical engineering

## ADVANTAGES

<b>MAINTENANCE</b>	MAINTENANCE-FREE
<b>RECHARGING</b>	SELF-CONTAINED DEVICE
<b>INSTALLATION</b>	EASILY MOUNTED PIPE-INSERTS
<b>SIZE</b>	NO ADDITIONAL SPACE REQUIRED
<b>RESPONSE TIME</b>	ALMOST INSTANTANEOUS
<b>FLOW RESISTANCE</b>	NO ADDITIONAL RESISTANCE
<b>Reliability</b>	100 %





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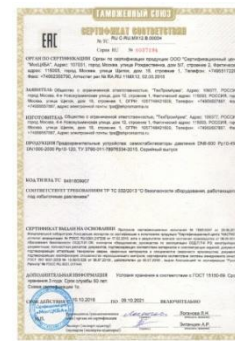
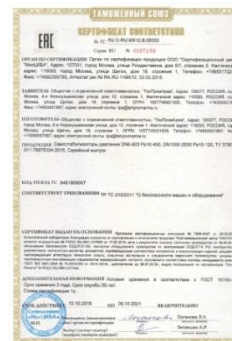
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E-mail: tpa@techpromarma.ru

## CERTIFICATION

**International Certificate ISO 9001**  
**Quality Management System**



**Certificates of Compliance**  
**Technical Regulations of the Customs Union**  
**RU C-RU.MX12.B.00003,**  
**TC RU C-RU.MX12.B.00004**



**International Certificates**  
**CE- marking**



**Certificates of Compliance**  
**at Nuclear Power Plants**





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## PATENTS

European Patent Organisation  
makes a decision to grant the  
European Patent



Device for damping pressure fluctuations in  
main delivery pipelines  
**Utility Model**  
№ 135427 of 10.12.13, expires 31.07.2023.



The USA Patent  
Method of damping pressure  
fluctuations in main delivery pipelines  
**Invention Patent**



EA. Method of damping pressure  
fluctuations impulses of transported  
medium in main delivery pipelines  
**Invention Patent**  
№ 026034 of 28.02.17.



Method of damping pressure  
fluctuations in main delivery pipelines  
**Invention Patent**  
№ 2531483 of 31.07.13,  
expires 31.07. 2033.



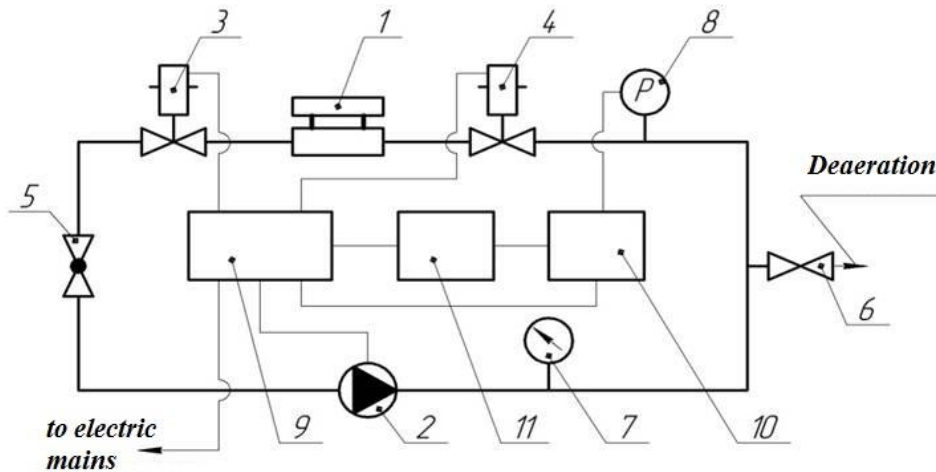
Pressure stabilizer  
of transported medium with external  
impulse relievers  
**Utility Model**  
№138548 of 31.07.13, expired 31.07.2023.



Collapsible autoreliever of pressure  
surges in process medium in  
main delivery pipelines  
**Utility Model**  
№ 136523 of 31.07.13, expired  
31.07.2023.



## HYDRAULIC TEST STAND OF PA PERFORMANCE





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# Thank you for your attention!