



**ISAS**

**IMPULSE STORM-A(S)**

**JET COMBINED FOAM FIRE-FIGHTING SYSTEM**

**TECHNICAL SPECIFICATION**

**VERSION 2015**





**DESIGN AND TECHNICAL CONCEPT:**

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**MANUFACTURERS OF THE MAIN COMPONENTS:**

FEDERAL STATE CENTER FOR DUAL-USE TECHNOLOGIES "SOYUZ"

JSC SCIENTIFIC INDUSTRIAL CORPORATION SOPOT

**APPROVED BY:**



**BRAZILIAN MILITARY FIRE DEPARTMENT THE FEDERAL DISTRICT  
(CORPO DE BOMBEIROS MILITAR DO DISTRITO FEDERAL).**



**FEDERAL STATE ESTABLISHMENT ALL-RUSSIAN RESEARCH INSTITUTE FOR FIRE PROTECTION OF  
MINISTRY OF RUSSIAN FEDERATION FOR CIVIL DEFENSE, EMERGENCIES AND ELIMINATION OF  
CONSEQUENCES OF NATURAL DISASTERS.**

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Ver: 01  
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## 1. INTRODUCTION

This document contains drawing information, principles of operation, characteristics and rules for the operation of ISAS system - Jet Foam Combined Fire-Fighting System. This system consists of the union of autonomous ISAS tanks of 7500 liters combined with:

Ring firefighting pipeline for extinguishing oil tanks of any volume.



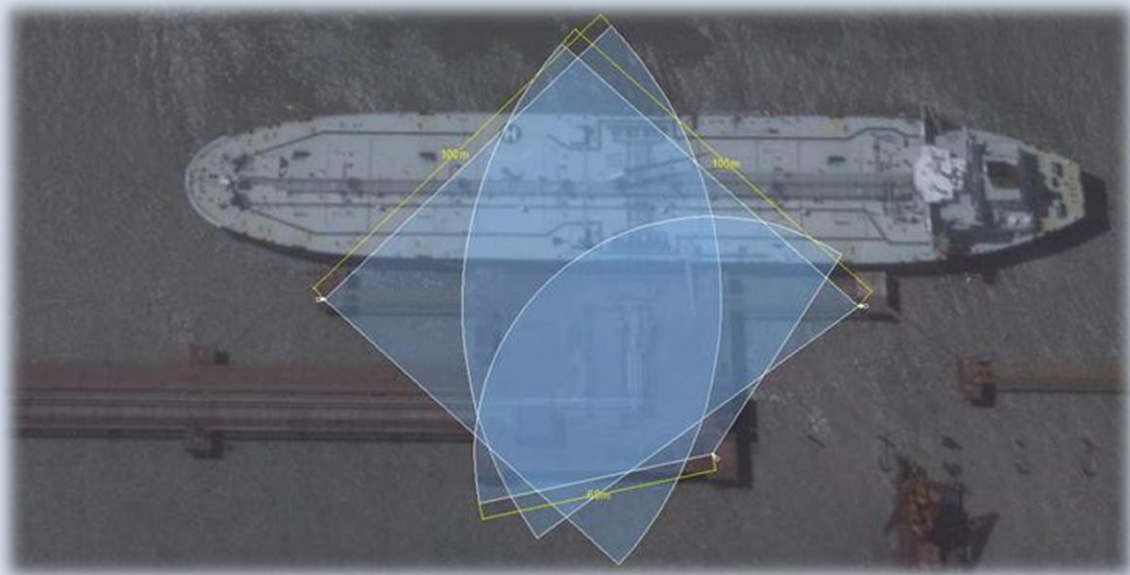
Foam monitors Blizzard 300, 150 and 250, enabling the realization of a powerful immediate and effective intervention.



### 1.1. PURPOSE.

The object of this technical specification one firefighting system for protection of oil storages or sea port facilities that perform hydrocarbon movement. The whole area of a platform of port operations may be protected using three sets each being composed of one ISAS-module 7500 and a middle expansion foam to be selected according to the risk analysis and the area to be protected.

The solution will provide a total volume of 225,000 liters of ME foam monitor, which will be released at a rate of up to 9,000 liters medium expansion foam per second, with a range of up to 100 meters. The system goes into full operation within five seconds after your drive. The figure below shows, graphically, a possible proposal for location and each set coverage radius. For this purpose, three sets of equipment would be used, providing 625,000 liters of medium expansion foam.



**Example coverage area Berth#106 of the Port of Itaquí, Brazil.**

In view of the risk area has approximate dimensions of 30 meters by 40 meters, a total of 1,200 m<sup>2</sup>, providing a volume of approximately 520 liters per square meter of medium expansion foam. This amount of foam is 745% higher than the recommended volume of medium expansion foam manufacturers and as defined in NFPA 11.

## **1.2. REFERENCE STANDARDS AND GENERAL**

The fire-fighting system for medium expansion foam ISAS was developed to enable risk areas and buildings where necessary the existence of production, handling, storage and distribution of flammable or combustible liquids located inside buildings or open for fire fighting. The system is built according to the basic and essential requirements of the standards listed below. Being an unconventional system in the form of operation, there are elements of these standards are not applicable.

### **International standard:**

- NBR 12 615 - fire fighting foam system;
- NFPA 11 - Standard for Low-, Medium-, and High- Expansion Foam 1998 Edition;
- ANSI B 31.1 - Piping and piping systems.

### **Russian and CIS standard:**

- GOST RV 15.110-2003 "System development and launch of new products. Military equipment. Documentation reporting on scientific technical research and development, preliminary design and experimental design work"
- GOST RV 15.203-2001 "System development and launch of new products. Military equipment. The procedure for the implementation of experimental design works on creation of products and their components"
- GOST 15.201-2000 "System of product development and launching into manufacture. Products of industrial and technical designation. Procedure of product development and launching into manufacture" agreed with ISO 9001:2008.
- GOST 52630-2012 "Steel welded vessels and apparatus. General specifications"
- TR TS 032/2013 "Technical regulations of the Customs Union "About safety equipment operating under excessive pressure", (agreed with DIN 28011, DIN 28013)





Mechanical foam is filled with an aggregate of air bubbles generated by purely mechanical means of aqueous solutions containing a concentrate of animal, vegetable or synthetic origin. Mechanical foam is an excellent agent for the prevention and extinguishing the fire in different situations, satisfying all the requirements relating to a very low density fluid and high capacity of heat absorption. Its density being lower than the flammable liquid, allows particularly be used to form a floating cover, quenching, cooling and covering the fuel in order to stop the evaporation of vapor and prevent its mixture with oxygen in the air.

The system is designed to work with any foaming extract with an expansion rate of 30: 1 and the concentration can vary from 1% to 6%. The mixture of water with Medium Expansion Foam (MEF) is performed directly by fixed flow foam nozzles. The mechanical generation of the froth occurs through the guns monitors have cameras that allow air mixture to mechanical foaming solution.

The MEF is stored in tanks or metal containers adequately protected against corrosion, located next to the ISAS tank. MEF the tanks are designed so as to have adequate vents, exhaust valves, measurement and filling device constant level of control, manhole to facilitate inspection, cleaning and taking samples.

The efficiency of the system ISAS - MEF monitor, unlike conventional systems, is due to the possibility of achieving release of large amounts of medium expansion foam within seconds of the start of an incident, allowing to submerge the entire risk area in less than one minute. Based on this principle, the system can cover the entire risk area with a volume of more than 700% recommended by the foam manufacturer and as described in NFPA 11. MEF supply is determined by the solution flow and the expected volume ISAS water tank,

Additionally, the system ISAS – MEF Monitor may have a valve plug to allow the use of his monitor with external pumps station. The ISAS system - MEF Monitor not have pumps. The water flow and provided by pressurizing the water tank through a chemical reaction of a solid aerosol compound, allowing a pressurization can range from 0.2 MPa (2 bar) to 3.0 MPa (30 bar) pressure reaching operation in less than five seconds, with water flow rates of up to 300 liters per second.

## **1.2. RIGHT OWNER AND MANUFACTURERS OF THE MAIN COMPONENTS**

A New Impulse Technologies LLC was established in 1991 the city of Kiev, Ukraine, with the objective of building and marketing of new technologies for fighting fires in industrial plants. In the early 90s, the company has built and delivered more than 40 vehicles with powder dispersion technology "Impulse Storm" for oil and chemicals factories in Ukraine, Russia and Yemen. At the end of the decade, the company introduced a new version, lighter, which was developed and produced for use by Ministry of Defence of Egypt.

In 2003, due to political instability in Ukraine, the company moved to Moscow, where it remains today.

The 2000s was marked by the technological development of instant spray methodology, which led to development of a fully automated fire fighting system (UIS-48S system). At the end of the decade, this system was tested and approved by Petrobras in a test course built especially for this purpose. It was found that the system in addition to being extremely efficient in fire detection and fire extinguishing in external industrial areas, has been demonstrated exceptionally able to effectively extinguish the fire in an area with LNG.

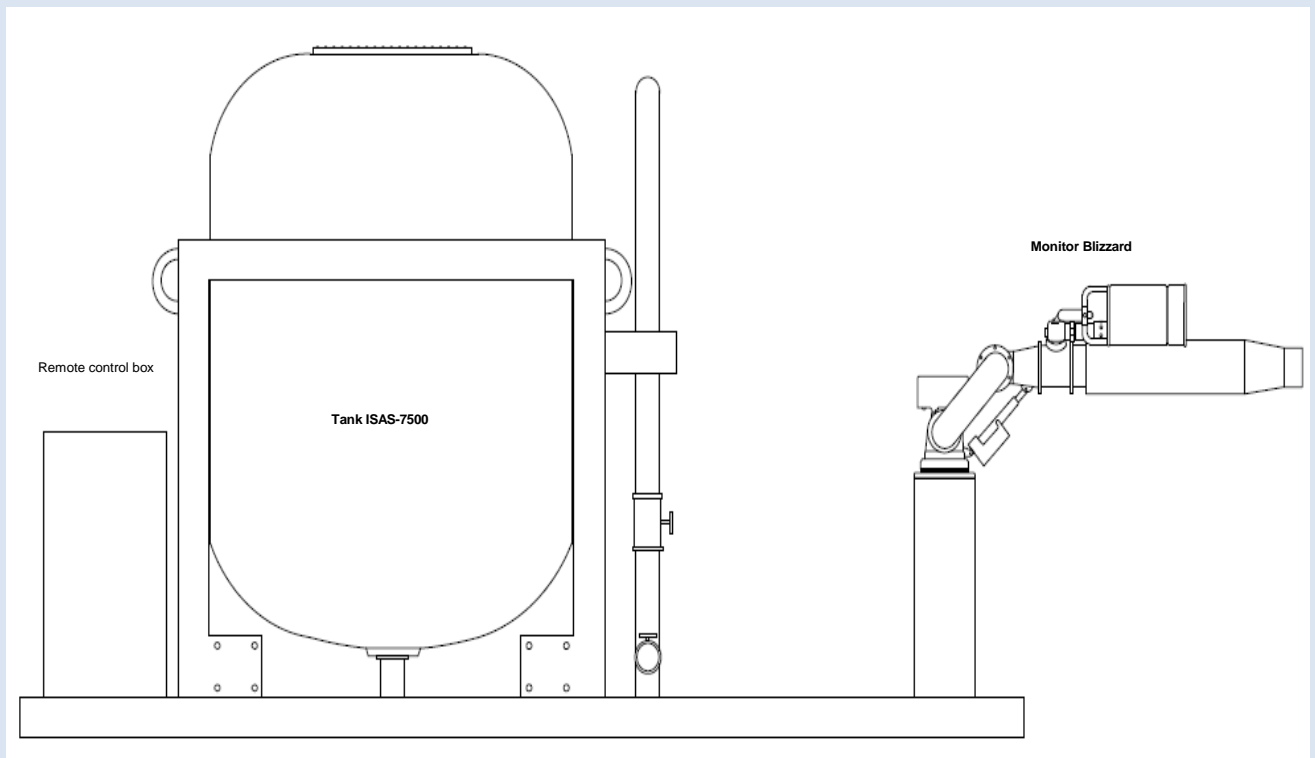


In 2012, the new technology ISAS for the autonomous dispersion powder, water or foam was created. This new equipment has been developed in partnership with the Russian Federal Center for Dual-Use Company Technologies "Soyuz", which is one of the leading companies in the military-industrial complex of the Russian Federation. More than 80 percent of modern missiles and Russian rockets are equipped with propellers designed and developed in-house "Soyuz", which was responsible for the design and specification of the pressurization of the tanks pads.

In late 2014, a partnership was signed with JSC Scientific Industrial Corporation SOPOT, founded in 1994 with the goal of designing and manufacturing the monitors guns with technology "Blizzard", whose settings allow extinguishing foams are released at distances up to ten times more than the other existing monitors cannons. Today the monitors of Sopot equip thousands of fire-fighting vehicles, several railway stations, over 16 refineries, several industrial facilities of oil companies, oil rigs, equipment and vehicles with three airports, hydrocarbon facilities in two ocean ports and various chemical industries.

## 2. SPECIFICATION OF EQUIPMENT

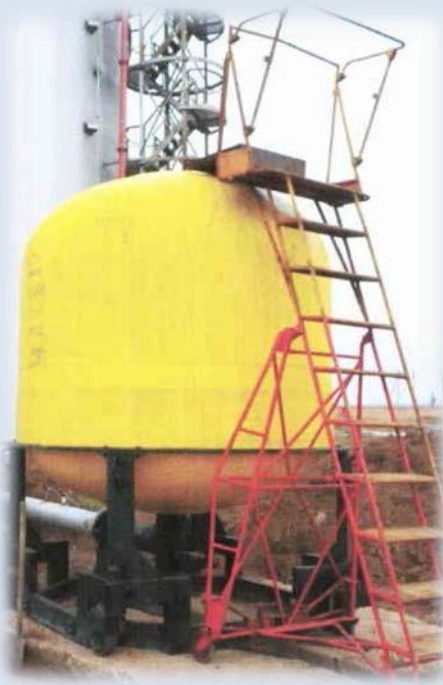
The devices that make up the fire protection system is composed of ISAS-module 7500 and low and medium expansion foam as described below. The system has additionally connection point for interconnection to external pump station, allowing the use of foam monitors once downloaded the self ISAS-7500 expansion module.



**System ISAS – Foam Monitor**



## 2.1. AUTO EXPANSION MODULE ISAS-7500



The ISAS-7500 self expansion modules are formed by tanks with a capacity of 7500 liters, the storage tank extract of forming foam. The tanks are constructed of fiberglass or stainless steel, mounted on a steel base. The modules are designed to remain in drive readiness for a period of 10 years. After this period should be serviced and being recharged. Its pressurization system, which may vary from 0.2 MPa (2 bar) to 2.0 MPa (20 bar), according to the project requirements, can achieve the operating pressure in less than four seconds, with flow rates up to 300 liters per second.

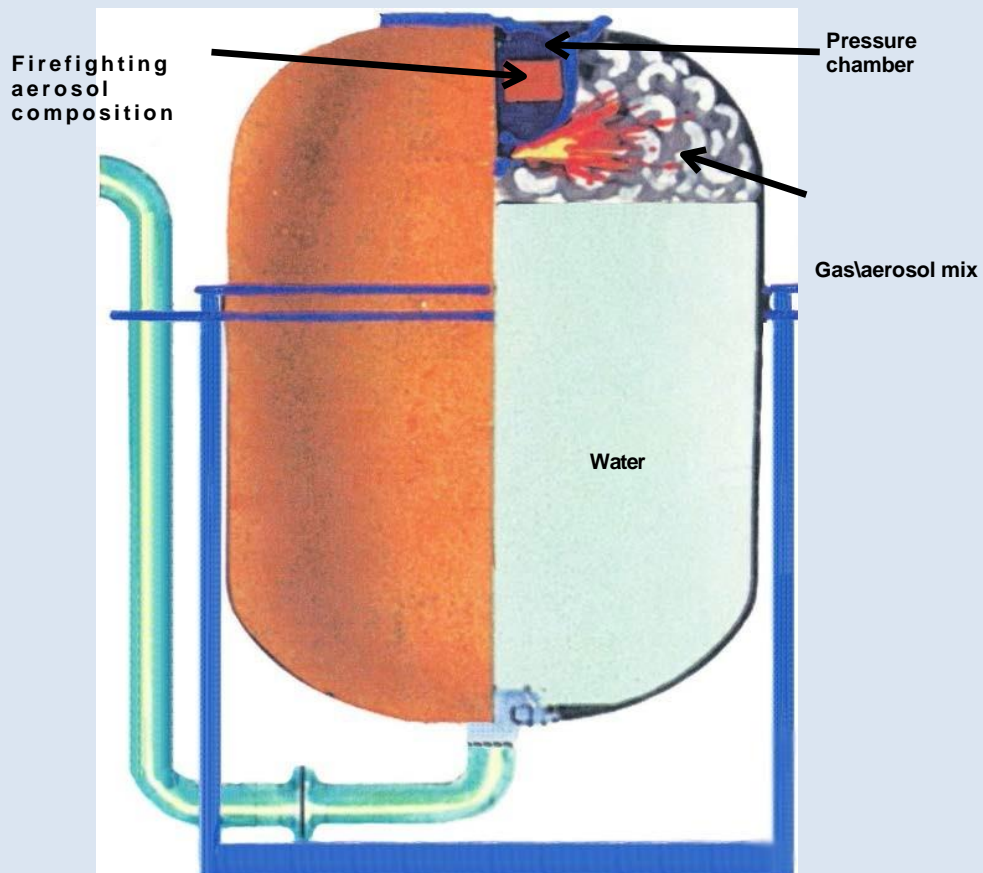
In the upper part of the tank is located pressurizing chamber, with the gas generator to the base of a solid aerosol fuel compound. The pressurization of the system is performed through the chemical reaction of the solid fuel compound, which is an inert, nontoxic product, which is stable until activated by an electrical pulse, causing them to be emitted large amounts of 10 % – a solid phase and 90 % – a gas phase.

Gas phase Aerosole:

CO<sub>2</sub> – 46,9 %

N<sub>2</sub> – 24,6 %

The chemical composition of this compound is developed in the form to provide the pressures and flows wanted in the tank, maintaining it constantly up to his total unloading.





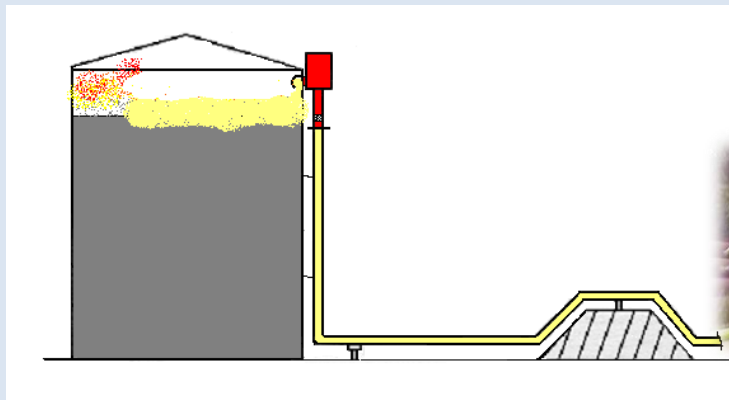
### Features ISAS-800, 2000, 7500

1. Fire extinguishing fluid volume, l	800	2000	7500
2. Mass of supplied system, kg	250	300	1000
3. Lag effect (start time), sec	0.5...2	0.5...3	0.5...3.5
4. Fluiding supply intensivity, l/s	10...50	10...100	50...300
5. Reloading time, hours not more than	0.5	1	1
6. Temperature range, °C	-50...+50	-50...+50	-50...+50
7. Operation term, years	10	10	10

Pressure generators by ISAS technology.



Not need outer water pipeline, not need pump station, not need external power.







## 2.1. MEDIA FOAM EXPANSION MONITOR

Monitors "Blizzard" are designed to create combined jets of foam low and medium expansion, mechanically aerated, also allowing the jet of water. Due to the effect of the combination of foams combined, these units are ideal for extinguishing large fires in flammable liquid and solid fuels, as well as to create a shield to light and heat in the rugged areas. It is highly effective in the neutralization of toxic gases into the atmosphere. It can be used as either a fixed fire fighting unit in high-risk areas as well as in vehicles, including boats.

All the monitors are manufactured by JSC Scientific Industrial Corporation SOPOT, founded in 1994 and headquartered in Doroga Street in Metallostroy h.5, A, Promzona Metallostroy, St. Petersburg, Russia. Possess certification of Russian Maritime Register of Shipping, association classification and certification associated with IACS - International Association of Classification Societies.

While the IACS is a non-governmental organization, plays an important role within the International Maritime Organization (IMO), to which it provides guidance and technical support and develops unified interpretations of international legal regulations developed by the Member States of the IMO. Once adopted these interpretations, these are per each IACS member society in the certification process. Since Brazil is one of the member countries of the IMO, adopts the same interpretations and recognizes the certificates issued by classification societies associated with the IACS.

The monitors to be used in security systems with ISAS tanks are then related. All these units operate with combined jets foam



### 2.2.1. BLIZZARD 300

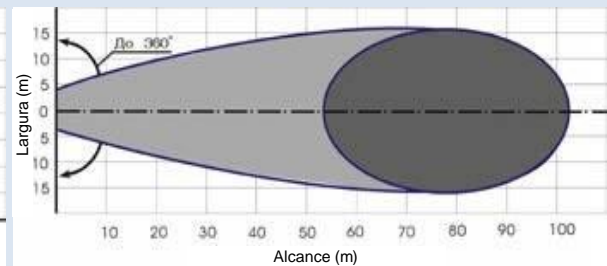
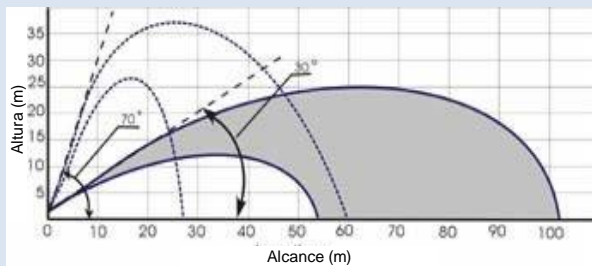


#### TECHNICAL CHARACTERISTICS

Performance at medium expansion foam	9000 l/sec
Performance on the water	300 l/sec
Range of feed stream on the water	160 m
Range of feed streams for medium expansion foam	100 m
Multiplicity of foam	30± 5 m
Vertical angle	+75/-20 degrees
The angle of rotation	to 21 degrees
The control system of fire monitors	Manual and remote
Dimensions (L * W * H)	2660*1250*1482mm



### 2.2.2. BLIZZARD 250



### TECHNICAL CHARACTERISTICS

Capacity by foaming agent, (l/min)	15000	
Capacity by foam	450000	
Delivered distance of water jets by the farthest drops, (m)	120 m $\pm$ 10	
Delevered distance of medium expansion foam, (m)	110 : 120	
Input pressure [MPa (kg/sm <sup>2</sup> )]	1,0 - 1,2 (10 - 12)	
Total weight,[kg]	130	
Overall dimensions, mm	Length	2760
	Width	1065
	Heigth	1250