



CMKA® PRODUCT

**WITH ENAMEL
COATING NOW**



ALTERNATIVE

NORTHERN INTERINDUSTRY COMPANY

THE RIGHT CHOICE

First of all, we would like to thank everyone who was at the forefront of a new production, who believed a dream and overcame the insurmountable, and those who were first to appreciate wonderful properties of new energy-efficient product and take responsibility to choose new heat exchange elements from that little-known developer and manufacturer, especially that man who devoted his life to new and innovative solutions, which brought an inestimable advantage for the electric-power industry of the country.

WE ARE ALL HIS APPRENTICES AND STUDENTS



CMKA® HEAT EXCHANGE ELEMENTS for rotary regenerative air heaters are the breakthrough in power-plant engineering industry. Its application provides top results in terms of power plants performance.

Choosing CMKA® heat exchange elements, you get highly innovative quality product that increases energy performance efficiency, reliability and environmental friendliness of boiler unit equipment, power plants and industry in general.

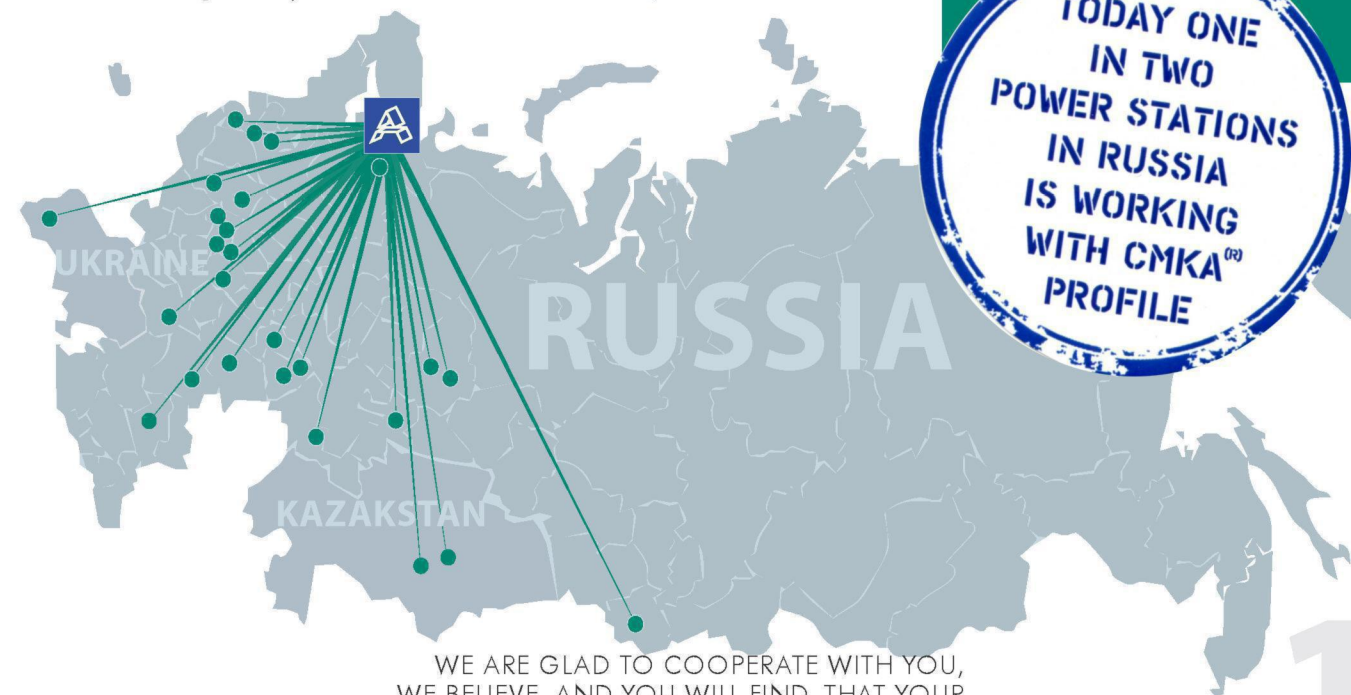
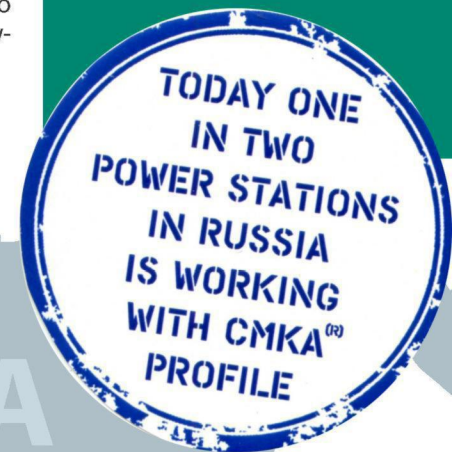
Since 2005 CMKA® trade mark has become in a short time a widely popular brand in the Russian market. According to the trading results using open electronic platforms b2b in 2011, four of five Russian consumers have chosen CMKA®, as for the volume of sales it is no less than 87.6 % of the total weight of packaged heat exchange elements for the air heaters installed at Russian power plants this year.

One of ten boiler units in Russia is working with CMKA® heat exchange elements installed in air heater at the beginning of 2012. Their number increases every year.

According to the analysis, Russian heat and electricity producers achieved economic effect of more than \$ 1 billion for the last 7 years of the new product application.

In addition, the heat exchange elements have been supplied to the foreign market since 2009 and its share in this segment is growing steadily.

ONE IN TEN
BOILER UNITS
IN RUSSIA
IS WORKING WITH CMKA®
HEAT EXCHANGE ELEMENTS



WE ARE GLAD TO COOPERATE WITH YOU,
WE BELIEVE, AND YOU WILL FIND, THAT YOUR
CHOICE IS RIGHT

«HEAT EXCHANGE ELEMENTS NEED LOVE...»

OH, YOUR DAYS ARE BLESSED!
DARE THE RECENTLY
ENCOURAGED TO SHOW BY
YOUR DILIGENCE THAT THE
RUSSIAN LAND COULD GIVE
BIRTH TO ITS OWN PLATOS AND
QUICK MINDS NEWTONS.
M.V. LOMONOSOV

The design of packages and profile parameters are developed by Vladimir Dmitrievich Komyagin, the famous Russian thermal power engineer, involved in research and practice activity to improve boiler unit operation for over 40 years with successful implementation of dozens of his developments at many stations in Russia and abroad.



PATENTED IN 11 COUNTRIES

CMKA® HEAT EXCHANGE ELEMENTS FOR ROTARY REGENERATIVE AIR HEATERS OF HIGH-CAPACITY BOILER UNITS FOR POWER PLANTS are designed and manufactured by «Northern Interindustry Company «The Alternative» Ltd, Severodvinsk, Russia as CMKA® trademark recognized in all countries of the Madrid Agreement.

The copyright for the design of packaged CMKA® heat exchange elements is protected in 11 countries of the world. The specialists of the company carry out further scientific research and run the tests of new types of heat transfer surfaces.



CMKA® heat exchange elements are realized through the system of specialized authorized dealers and distributors who have an official allowance (certificate) or a letter of commitment signed by the head of association as a copyright holder. In special cases it is possible to deliver directly from the manufacturer.



PRODUCT ADVANTAGES

«... — ACCORDING TO MY CALCULATIONS — AT LEAST ONE OR TWO PERCENTS.
 — ONE PERCENT? IS IT MUCH OR LITTLE?
 — THE NOBEL PRIZE CAN BE GIVEN FOR HALF A PERCENTAGE POINT...»

From conversation between the heads of equipment purchase department and technical department of the wholesale generating company during discussion of pessimistic forecast for increasing the efficiency of the boiler the heat exchange elements of which are replaced by CMKA®.

Upon completion of considered analysis of boiler unit performance and after installation of CMKA® heat exchange elements based on the results of seven year operation of CMKA® heat exchange elements, at various boiler units, under different operating conditions and for different types of fuel, making thorough aerodynamic heat calculations for each type of boiler unit and air heater and finally, after through independent commercial product tests, initiated by our customer in 2007, we can certainly present the advantages of the CMKA® product for all major indicators: **ENERGY EFFICIENCY** — high, 1.5-2.5 times higher than the average equivalent (See Page 10), **ECONOMICAL EFFICIENCY** — high, enterprises, generating heat and electricity due to the use of CMKA® heat exchange elements, saved fuel to the amount of more than 1 billion dollars from 2005 to 2011, **COST OF ENERGY PRODUCTION** — is being reduced due to the large energy (fuel) savings and wide (100%) scope of energy consumer, **SELF-SUPPORT OF CAPITAL INVESTMENT FOR REPLACEMENT** — depends on the type and cost of used fuel and operating conditions, from 2 (!) to 18 months, **ENERGY SECURITY** — high, improves stability of the entire boiler unit and solve the problem of power shortage and rapid changes in steam load, **SERVICE LIFE** — increased due to preliminary selection of the optimal profile parameters based on individual heat aerodynamic calculation and proper organization of heat and aerodynamic processes in air heater, providing to get away from dew point (H_2SO_4) on metal surfaces as well as demonstration of self-cleaning properties, convenient air heater operation and stable boiler performance during the entire service life of heat exchange elements, **ENVIRONMENTAL FRIENDLINESS** — high (See Page 11), **SELF CLEANING** — ability found by our customers during operation of CMKA® heat exchange elements that well-known analogues miss.

ENERGY EFFICIENCY

ECONOMICAL EFFICIENCY

COST OF ENERGY PRODUCTION

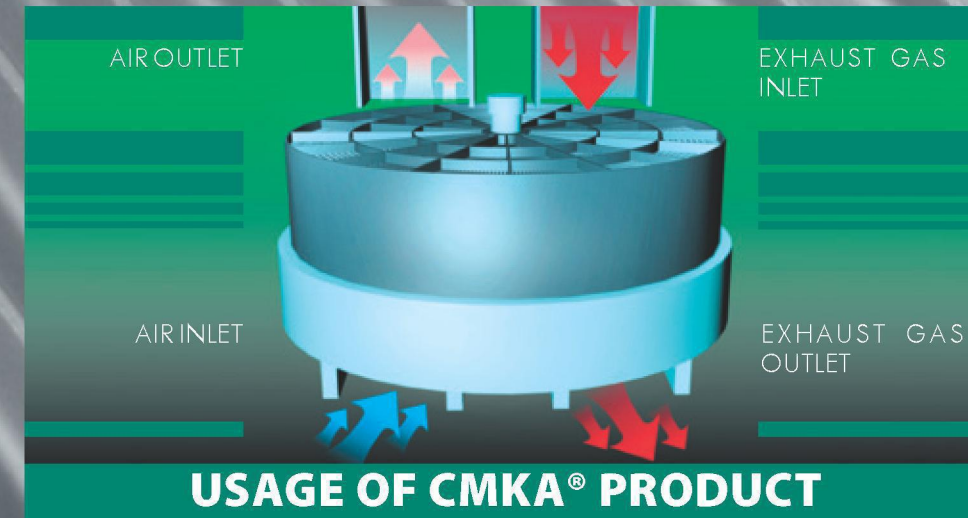
SELF-SUPPORT OF CAPITAL INVESTMENT FOR REPLACEMENT

ENERGY SECURITY

SERVICE LIFE

ENVIRONMENTAL FRIENDLINESS

SELF CLEANING



Going back to the preamble of this page we are glad to inform that recorded efficiency at one station was up to 4.2 %, the average efficiency at all boilers at another one increased by 5.5 % for several years, and emphasize that heat exchange elements including CMKA® designed by V.D. Komyagin were installed at all air heaters of the station at different times.

Performance of boiler units before installation of CMKA® heat exchange elements and after it, professional reviews, and other data on CMKA® heat exchange elements are listed in monthly bulletin «Reference of specialists and results of application of CMKA® heat exchange elements for air heaters» issued by «Northern Interindustry Company «The Alternative» Ltd.

Optional and important:

HEAT AERODYNAMIC CALCULATION is carried out by the specialists of each boiler unit, as far as we know, we are the only producers (and designers) who are equipped with this «mandatory» service opportunity

INSTALLATION SUPERVISION — our specialists go on-site and check the correct installation of CMKA® heat exchange elements when required and by agreement with the customer,

RECOMMENDATIONS — we always give recommendations for a customer to perform a number of additional technological measures that improve air heater. They require some expenses, but they are paid back very quickly.

HEAT AERODYNAMIC CALCULATION

INSTALLATION SUPERVISION

RECOMMENDATIONS

INDIVIDUAL APPROACH



REQUIRE BOILER UNIT OPERATING PARAMETERS FROM POWER PLANT

ANALYZE CONDITION OF A BOILER UNIT

SELECT DESIGN STYLES

PERFORM THERMAL AERODYNAMIC CALCULATIONS

CARRY OUT LARGE-SIZED COMPUTATION CALCULATION OF ECONOMIC IMPACT FOR EACH OPTION

CHOOSE OPTIMUM MODEL

JUST 658 BOILER UNITS OF TWO OR TREE DOZENS OF TYPES THAT INVOLVE AIR HEATERS ARE INSTALLED AT POWER PLANTS IN RUSSIA. Any one of them works under different environment conditions and has its own constructive features, i.e. it requires an individual approach, since what is good for one, it could be harmful for another. Boilers are like people.

Therefore, before proceeding to design and manufacture we carry out calculation of aerodynamic heating for parameters and conditions that the particular boiler works with. For this purpose we will:

- Require boiler unit operating parameters from power plant;
- Analyze condition of a boiler unit;
- Select design styles;
- Perform thermal aerodynamic calculations;
- Carry out large-sized computation calculation of economic impact for each option;
- Choose optimum model of boiler unit and offer it for the customer. Depending on the need to improve any parameter of boiler unit we can offer for the customer several versions. We can provide our specialist to inspect air heater during shut downs for preliminary approvals of package size if you doubt in respect of significant thermal raypath bending of air heater. According to the customer's request the package can be sized considering cell dimensions taken in-place that differs from the project.

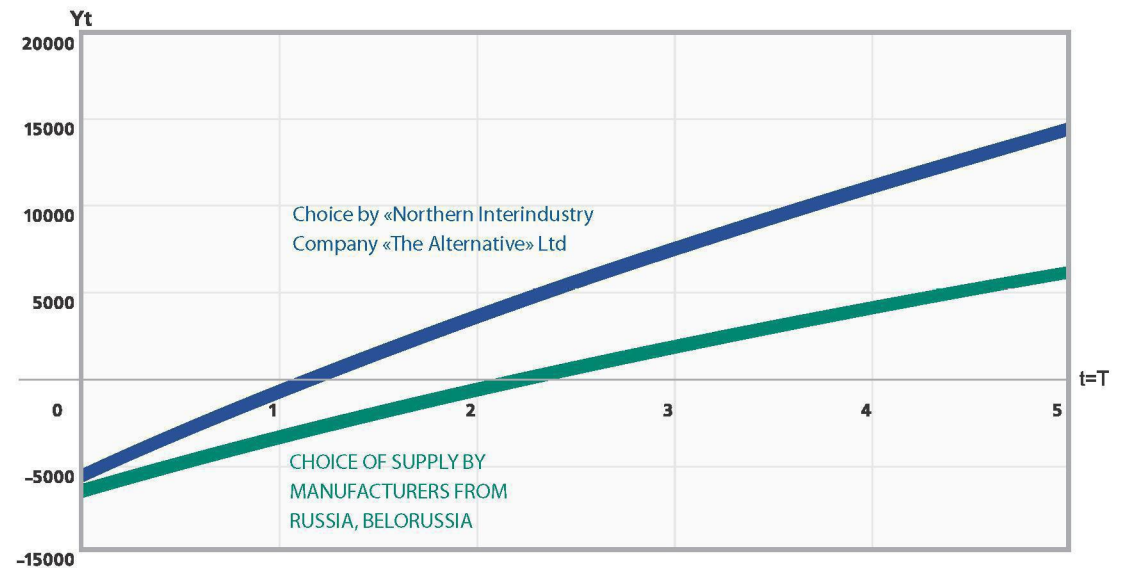
Upon request and preliminary agreement, our expert arrives at the plant to supervise, i.e. to monitor correct installation into air heater rotor.

Also, we provide additional recommendations for additional measures that improve performance of air heater and boiler, and elaborate recommendations for air heater design debugging to improve self-cleaning process from ash and slag contamination.

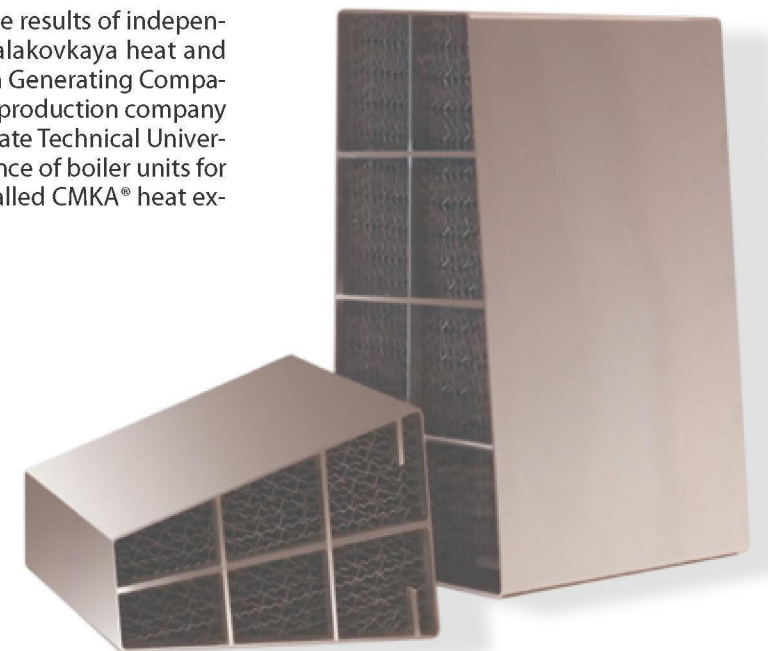
CONFIRMED BY TESTS

IT IS KNOWN THAT PERFORMANCE OF BOILER UNITS DEPENDS ADDITIONALLY TO A LARGE EXTENT ON PERFORMANCE OF AIR HEATER.

DIAGRAM FOR THE DETERMINATION OF PAY-BACK PERIOD FOR THE CONSIDERED REPLACEMENT VARIANTS OF HEAT EXCHANGE ELEMENTS FOR REGENERATIVE AIR HEATER PBT-54



This is confirmed by the results of independent industrial tests at Balakovkaya heat and power plant of Volzhskaya Generating Company-7, run by scientific and production company «Gradient-C» at Saratov State Technical University in 2007 and performance of boiler units for all power plants with installed CMKA® heat exchange elements.



ENERGY EFFICIENCY

At the present moment, energy efficiency is one of the most important conditions for successful development of enterprises. It is often combined or taken for energy conservation. They are not the same thing. For example, 5 % of population use energy-efficient equipment regularly and have replaced 25 % of their equipment at their facilities by energy-saving equipment with maximum effect by 50 %. In general, for one region included in the maintenance of a thermal power plant the maximum benefit from energy-efficient equipment will amount to 0.6 %. If the same power plant is equipped with energy-efficient equipment with 100 % coverage of consumers, as it was specified at the heat and electricity production stage with increase of boiler efficiency 1 to 5 %, the significant difference is obvious with noncomparability of the initial costs in favor of the latter.

ENVIRONMENTAL FRIENDLINESS

The Universe is infinite. It is incomprehensible and frightful in its diversity. We do not know, but almost certain that somewhere there is some form of life, other sentient beings and other habitable planets, that resemble ours only vaguely. We assume that and are look into the space with hope and interest. However, we do know that there is no better place than our planet named the Earth. We inhabit it, the only intelligent beings on the Earth with small percentage of thinnest biosphere, making attempts and being able to change its pristine wilderness. We have learned a lot during the short time that was allotted for our civilization.



Differential characteristics of CMKA® energy-efficient product:

1. Provides energy efficiency at power generation stage rather than power audit and consumption.
 2. Simplifies maximum effect task by 100 % coverage of consumers.
- Integrated solution for energy conservation will have maximum effect. And this decision should be taken today, not tomorrow.

We are self-confident. We build mega-cities and create masterpieces of art. We conquer the bowels of the earth and prowl the oceans. We raise a family and look to the sky. We are gratified by our success and thankful for our lives. We love our Earth. And it is we, Humanity and everybody, who can do something for it.

We take pride in creation of the product that provides reduction of greenhouse effect, harmful atmospheric emissions and harmful substance settlements. According to the simplest analysis the annual reduction of emissions of NO_2 — 100 t, NO — 54 t, SO_2 — 1075 t, CO_2 — 10 t is observed for 1MW of specified capacity of power plants.

This improves regional environmental situation, reduces environmental safety costs and consolidates reputation of the generating company as environmental responsible company.

WE ARE GLAD TO BE WITH YOU
TOGETHER WE WILL MAKE OUR WORLD CLEANER

DESIGN STYLES

LOW COMACTNESS

PROTECTIVE

HIGH COMACTNESS

COMBINED

COLD

CMKA® heat exchange elements fit for all types and design styles of domestic and imported rotary regenerative air heaters. Filling of air heater rotor with CMKA® heat exchange elements packages can be different depending on operation conditions and performance of the boiler unit. Horizontal and vertical configuration of packages can correspond to the design location or be optimized for the set tasks. Package location plan in the rotor is submitted to the customer for approval after analysis and calculation.

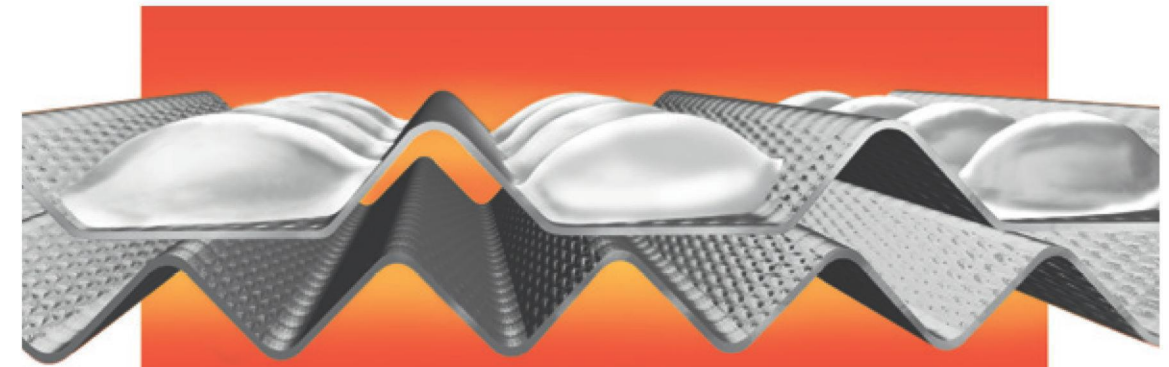
LOW COMACTNESS — used in air heaters of boilers burning coal with high content of mineral mass with dry slag removal. Eliminates clogging of heat exchange elements passages with slag carryover and chark and stabilizes resistance. Mostly used for stabilization of resistance in air heaters with height of hot layer 2000-2400mm.

PROTECTIVE — used for air heater of boiler unit with slag removal to protect hot layer against abrasive damage of chark particles.

HIGH COMACTNESS — to provide maximum effect, typically used for gas and black oil fuel.

COMBINED — different arrangement versions according to calculation and analysis results and assigned tasks.

COLD — as opposed to «standard section» of smooth plates of heat exchange elements of cold layer — the heat exchange elements of «Northern Interindustry Company «The Alternative» Ltd have enhanced type section and are gathered in the packages of fluted plate pairs. The CMKA® «cold» section increases the amount of heat removal in cold layer and improves decontamination conditions of heat exchange elements plate surface. Provide significant load reduction and extension of service life for all heat exchange elements layers in air heater.



HIGH PERFORMANCE SECTION OF HEAT-EXCHANGE PLATES

INNOVATIVE HEAT-EXCHANGE SURFACE

Optionally, CMKA® heat exchange elements can be made of low alloyed steels of 10XCHД (Russian Specification) or COR-TEN A types.

The CMKA® heat exchange elements are delivered in the packages with solidmetal housing.

You will find the list of drawings for every type of air heater in different design style of CMKA® packaged heat exchange elements in attached CD or receive it on demand from our experts giving consultation and recommendations.

IMPORTANT — Design style of any heat exchange elements is selected individually for every boiler unit. All of them are different indeed. Just as people.

We specialize in solutions of problems arising due to operation of your equipment. We do it professionally as developer and manufacturer of this equipment. Therefore, our experts will help you find exactly the version that you need for your boiler unit.

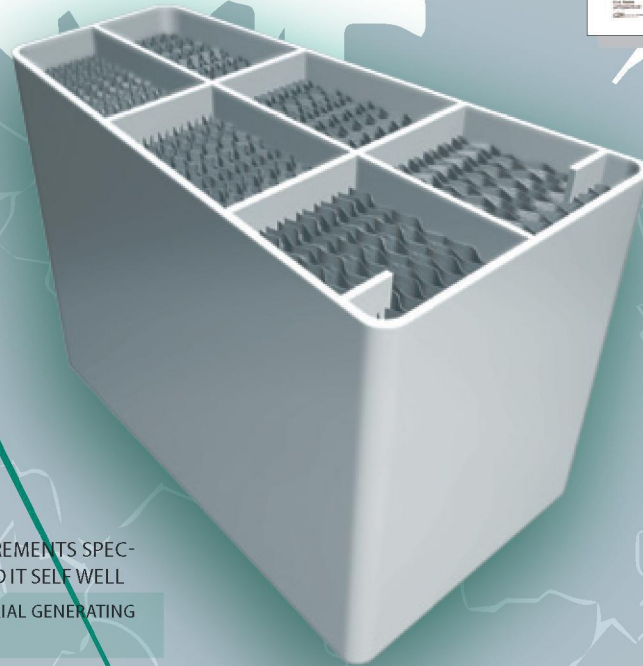
To further increase service life of the CMKA® heat-exchange elements, we recommend to cover cold layer elements with vitreous enamel coating applied by Ferro Technik BV Company.

REVIEWS

ALL THE ABOVE-MENTIONED IS PROVED BY YOU – our customers, consumers of unique innovation energy-efficient product that we have created for you.

THE CMKA® HEAT EXCHANGE ELEMENTS MANUFACTURED BY «NORTHERN INTER-INDUSTRY COMPANY «THE ALTERNATIVE» LTD PROVIDE REQUIRED AIR HEATING, REDUCTION OF FLUE GAS TEMPERATURE, REDUCTION OF LOSSES DUE TO FLUE GASES, AND THUS THE INCREASE OF THE BOILER OVERALL EFFICIENCY I.E. IT COMPLIES WITH IMPROVED HEAT EXCHANGING PARAMETERS IN COMPARISON WITH PREVIOUS HEAT EXCHANGE ELEMENTS

«ARKHANGELSK HEAT AND POWER PLANT», «TERRITORIAL GENERATING COMPANY-2» OJSC, MAIN ADMINISTRATION FOR THE ARKHANGELSK REGION



LISTED CHANGES OF BOILER UNIT OPERATION READINGS PROVIDE SIGNIFICANT FUEL SAVINGS, HAVING POSITIVE INFLUENCE ON ECONOMICAL EFFICIENCY AND PLANT PERFORMANCE RELIABILITY IN WHOLE

«ULYANOVSK HEAT AND POWER PLANT-2», THE BRANCH OF «VOL-ZHSKY TERRITORIAL GENERATING COMPANY» OJSC

INSTALLED HEAT EXCHANGE ELEMENTS MEET ALL THE REQUIREMENTS SPECIFIED FOR COMPONENT PARTS OF AIR HEATERS AND PRESENTED IT SELF WELL

«NORTHERN HEAT AND POWER PLANT», «NEVSKY» BRANCH, «TERRITORIAL GENERATING COMPANY-1» OJSC

AS A RESULT OF REPAIR OPERATION THE TECHNICAL-ECONOMICAL PARAMETERS IMPROVED SIGNIFICANTLY AS WELL AS DUE TO HEAT EXCHANGE ELEMENTS INSTALLATION FOR YOUR PRODUCTION

«NOVO-RYAZAN HEAT AND POWER PLANT-21» LLC, RYAZAN BRANCH

LISTED CHANGES OF BOILER PERFORMANCE PARAMETERS PROVIDE SUBSTANTIAL FUEL SAVINGS THAT BENEFICIALLY EFFECT COST-EFFECTIVE PERFORMANCE OF PLANT AND IMPROVES THE ECOLOGICAL SITUATION

«SYZRAN HEAT AND POWER PLANT», THE BRANCH OF «VOLZHSKY TERRITORIAL GENERATING COMPANY» OJSC

THE INSTALLATION OF NEW HEAT EXCHANGE ELEMENTS HELPED TO REDUCE SUCTIONS IN THE AIR HEATER, TO INCREASE HEAT EXCHANGE THAT LED TO THE REDUCTION OF FLUE GAS TEMPERATURE, THE INCREASE OF HOT AIR TEMPERATURE AND BOILER EFFICIENCY

«HEAT AND POWER PLANT-1», «VORONEZH REGIONAL GENERATION» BRANCH OF «TERRITORIAL GENERATING COMPANY-4» OJSC

ON THE BASIS OF OBTAINED RESULTS, CMKA® HEAT EXCHANGE ELEMENTS ARE RECOMMENDED FOR INSTALLATION AT ALL POWER FACILITIES OF LUKOIL COMPANY

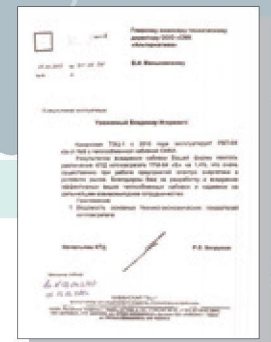
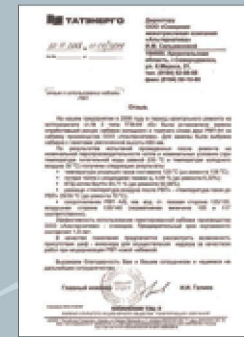
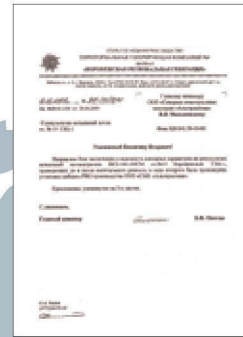
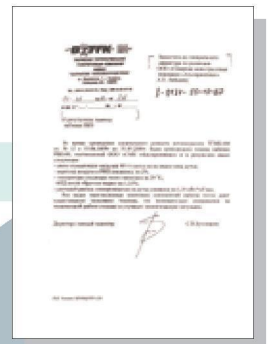
«LUKOIL-ASTRAKHANENERGO» LLC

WE EXPRESS GRATITUDE TO YOU AND YOUR EMPLOYEES AND HOPE FOR FURTHER COOPERATION

«KAZAN HEAT AND POWER PLANT-3», THE BRANCH OF «GENERATING COMPANY» OJSC

WE THANK YOU FOR DEVELOPMENT AND INTRODUCTION OF EFFECTIVE HEAT EXCHANGE ELEMENTS AND HOPE FOR FURTHER MUTUALLY ADVANTAGEOUS COOPERATION

«KAZAN HEAT AND POWER PLANT-1», THE BRANCH OF «GENERATING COMPANY» OJSC



QUALITY OF CMKA® PRODUCT

CMKA® HEAT EXCHANGE ELEMENTS have been manufactured since 2005. During this period we have received no complaint against quality of our product. We pay great attention to quality problems, we comprehend quality importance and function for our customer and successful development of our business.

We pay great attention to quality. Production of CMKA® heat exchange elements is certified in the facultative certification system EnSERTIKO, the system of business quality management is certified by Certification Association «Russian Register» in IQNet system for compliance with international quality management system ISO 9001 and the Russian military standard of quality system GOST RV 15.002. The company has its own group of certified auditors of quality management systems, inspected by the Russian Maritime Register of Shipping and has the license for manufacture and repair of weapons and military equipment.



WE PROPOSE QUALITY AND EFFICIENCY

QUALITY MANAGEMENT SYSTEM OF «NORTHERN INTERINDUSTRY COMPANY «THE ALTERNATIVE» LTD IS CERTIFIED FOR CONFORMITY WITH ISO 9001:2008 BY CERTIFICATION ASSOCIATION «RUSSIAN REGISTER» IN INTERNATIONAL NETWORK IQNET



PERFORMANCE PARAMETERS OF YOUR EQUIPMENT WILL SHOW MORE THAN YOU CAN SEE

Two CD-discs are attached to this publication. The first one is video presentation, which will help you to get acquainted with our product and the second one — to get acquainted with soft copy of this booklet, reviews of power plant experts and performance results of boiler units and other useful and interesting materials.

«Northern Interindustry Company «The Alternative» Ltd, Severodvinsk, Russia is copyright holder for all materials of this publication, electronic, video and other materials contained in attached disks. All materials are designed for power plants experts and energy companies only. Any unauthorized replication without copyright holder's permission is prohibited, source reference is mandatory.

© «Northern Interindustry Company «The Alternative» Ltd (NICA), 2013





31a, Arkhangelskoye shosse, Severodvinsk,
Arkhangelsk region, Russia, 164500
Tel: +7 (8184) 58 98 98, 50 10 65
Fax: +7 (8184) 52 95 95
E-mail: post@smk-alternativa.ru
www.smk-alternativa.ru
facebook.com/smkalternativa
twitter.com/smkalternativa