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Jachranka, 21– 23 October 2019.

AVANTGUARD

Authors:

Marek Puczkarski, Roman Rosiński, Antoni Prieto

Keywords: corrosion, cathodic protection, high zinc content epoxy coatings

Abstract:

A paper on new solutions in the area of steel surface protection with zinc primers. Avantguard is a product line that uses a completely new, patented anti-corrosion technology using activated zinc. The principles of the new technology, product design and achieved results have been discussed, which are important in the industrial application of coatings. Avantguard - gives excellent results in improving corrosion protection. It also improves the mechanical strength of coatings, brings significant benefits in the application process due to time savings, gives the possibility of using as a solution replacing zinc silicate paints. The rules for selecting products from the Avantgurad line were discussed depending on the general contractual requirements and specific application requirements.

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FIRE HAZARDS IN THE TUNNELS FIRE RESISTANCE, POLISH AND EUROPEAN APPROACH

Author:

mgr inż. arch. Iwona Gajecka

Keywords: tunnels, fire resistance

Abstract:

The paper is a brief overview and summary of the requirements set for the tunnels in three regulations in Poland regarding technical conditions to be met by road engineering facilities, railway constructions and metro construction facilities. In the European Union countries, other time-temperature curves are used to assess the fire resistance of tunnel construction elements than in Poland so far. They define more severe fire exposure than the standard curve. What is the level of thermal exposure taken into consideration in Polish regulations? Is our approach consistent with European one? The answer to some of these questions is the regulation of the minister of infrastructure published in August this year.

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CORROSION MANAGEMENT - management of processes related to corrosion based on project IMPACT PLUS by NACE

Authors:

mgr inż. Leszek Augustynek

mgr Bartosz Noworyta

Keywords: corrosion, corrosion management, impact

Abstract:

NACE is an organization founded in 1943, currently associating almost 36,000 members from 130 countries. It is recognized all over the world as an authority in the field of corrosion control. The organization runs a global project of managing processes related to corrosion. This project involves training of personnel of organizations cooperating with NACE, performing audits of companies and developing a synthetic rating of processes within the companies where it is implemented. In Jachranka IMPACT PLUS by NACE shall be presented together with possibility of participation by PSK.

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IMPORTANT ISSUES IN CORROSION AND ANTICORROSION PROTECTION SHOWN AT THE NACE CORROSION 2019 CONFERENCE

Author:

Bartosz Noworyta, ARMA Firma Inżynierska Kraków

Keywords: corrosion, Corrosion 2019, NACE, Nashville, USA, , sustainable development, , artificial intelligence, automated corrosion detection, , corrosion economics

Abstract:

In what direction is the modern anti-corrosion industry going? What is „Uber" approach to corrosion issues? Does the computer know better? What is sustainable development? Practitioners and scientists from the world of corrosion sought answers to these and other questions during this year's Corrosion 2019 conference organized by NACE International in March in Nashville (USA). During the lecture, the PSK delegate to this conference will present the most interesting aspects (practical and scientific) raised during lectures and in the conference corridors. Technological novelties will also be presented. In particular, the following will be presented: the NACE program offer, potential fields of PSK's cooperation with NACE, and the backstage of bilateral talks.

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Assessment of Anticorrosion Industry Enterprises based on Regulations adopted by the PSK Board

Authors:

inż. Tadeusz Abramski

Paweł Sobczyk

Keywords: anti-corrosion, regulations, industrial facility

Abstract:

The paper will present the premises underlying the elaboration and adoption of the criteria constituting the development of regulations on the assessment of enterprises. The work should be an impulse for discussion between representatives of executive companies and clients in the anti-corrosion industry.

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Corrosion of aluminium alloy AA6060 in glycol propylene solution

Author:

Halina Krawiec, AGH- Akademia Górniczo – Hutnicza im. St. Staszica w Krakowie, Wydział Odlewnictwa

Keywords: pitting corrosion, aluminium alloys, propylene glycol

Abstract:

Corrosion behavior of aluminum alloyAA6060, was tested in 30% aqueous propylene glycol solution. Corrosion tests were carried out at 20°C and 60°C. The effect of small amounts of chloride ions (0.001 M) on the corrosion resistance of aluminum alloys in propylene glycol solutions was also investigated. In order to determine the corrosion resistance of AA6060 alloy, corrosion potential measurements and potential dynamic polarization curves were carried out. The corrosion tests have been revealed that in the pits are formed in the matrix or at the interface matrix / Al9Fe2Si2 intermetallic phase of AA6060 alloy.

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NEW ANTICORROSIVE COATINGS PRESENTED AT EUROPEAN CONGRESSES

Author:

Małgorzata Zubielewicz

Sieć Badawcza Łukasiewicz – Instytut Inżynierii Materiałów Polimerowych i Barwników, Oddział Farb i Tworzyw w Gliwicach

Keywords: corrosion, protective coatings, nanotechnology, self-healing coatings

Abstract:

New developments in the field of protective coatings are discussed on the basis of papers presented at European conferences. Materials of following congresses are included: European Technical Coatings Congress (ETCC), Advances in Coatings Technology (ACT) and European Corrosion Congress (EUROCORR).

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MODERN ANTICOROSSION SOLUTIONS FOR CORRUGATED STEEL BURIED STRUCTURES WORKED IN DEMANDING ENVIRONMENT

Authors:

Ewa Kościńska, Karol Bzdawka

ViaCon sp. z o.o.

Keywords: corrosion, corrugated steel buried structures, culverts, soil-steel bridges

Abstract:

Soil steel structures made of corrugated plates and sheets are used in infrastructure construction for structures of various use: bridges, viaducts, culverts, tunnels, pedestrian and wildlife underpasses. Depending on the use and associated environment, these structures are exposed to various corrosion conditions. Elements that influence the rate of corrosion are aggressive atmosphere, high salinity of water and air, splash zone, fast water flow that caries bed load material, constant contact with soil. Depending on the conditions where the structure will be erected, proper anticorrosion system is chosen. The article presents an overview of solutions used on structures made of corrugated plates depending on their environment and required service life, including environments of seawater and very high abrasion where corrugated plate structures were not recommended so far.regulations in Poland regarding technical conditions to be met by road engineering facilities, railway constructions and metro construction facilities. In the European Union countries, other time-temperature curves are used to assess the fire resistance of tunnel construction elements than in Poland so far. They define more severe fire exposure than the standard curve. What is the level of thermal exposure taken into consideration in Polish regulations? Is our approach consistent with European one? The answer to some of these questions is the regulation of the minister of infrastructure published in August this year.

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RESEARCH REQUIREMENTS DURING TESTING ANTICORROSION SYSTEMS USED IN DIFFERENT BRANCHES OF INDUSTRY

Authors:

Leszek Komorowski, Agnieszka Królikowska

Instytut Badawczy Dróg i Mostów

Keywords: corrosion, corrosion tests, durability, requirements

Abstract:

Anticorrosive protection is used in various industries characterized by their own technical requirements resulting from exploitation conditions, expected durability periods and application possibilities. The requirements according to NORSOK, National Technical Assessment IBDiM and ITB guidelines, requirements for PSE and ENERGA transmission lines as well as railway requirements will be discussed. The differences between these requirements will be commented.

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DEVELOPMENT AND IMPLEMENTATION OF PRODUCTION TECHNOLOGY FOR A NEW ASSORTMENT RANGE OF ZN-AL ALLOYS WIRES, INTENDED FOR CORROSION PROTECTION BY SPRAY METALLIZATION

Authors:

dr inż. Piotr Osuch* , dr inż. Monika Walkowicz* , dr hab. inż. Andrzej Mamala, prof. nadzw.*

prof. dr hab. inż. Tadeusz Knych* , mgr inż. Tomasz Napióra** , mgr inż. Radosław Sokół**

* AGH Akademia Górniczo-Hutnicza, Wydział Metali Nieżelaznych, Katedra Przeróbki Plastycznej i Metaloznawstwa Metali Nieżelaznych,

Keywords: corrosion, Zn-Al alloys

Abstract:

One of the methods for corrosion protection of steel structures, which work in corrosive environments is coating them with zinc or Zn-Al alloys coatings. Among various techniques for the manufacturing of protective zinc coatings, the spray metallization is mainly used due to the size of the structure intended for corrosion protection. The most important applications of this technology are wind power towers, cast iron pipes, steel pipes, elements for the construction of semi-trailers, components of vehicles' construction, as well as a number of other applications, i.e. in the area of anticorrosive protection of infrastructure elements already installed in the field, e.g. bridges. Zinc spray painting, also known as zinc spray metalizing, involves the introduction of a zinc wire or to a gun in which, by the action of an electric arc or a flame of a combusted gas, the wire melts and the liquid phase particles are transferred to a metallized surface by compressed air. The wires that are the charge for this metallization process are produced by wire drawing process from wire-rod, which in turn is produced by continuous melting, casting and rolling (CCR) process using the Properzi casting machine and integrated rolling mill consisting of 11 rolling stands in a triangle-wheel configuration. The paper presents current state of the art and technology of production of Zn-Al alloys wires in industrial conditions in relation to physical phenomena, shaping the properties of the finished product in the dynamic conditions of the CCR process and the process of drawing wires. The results of our own research on a number of technical and technological conditions were discussed on the way to the planned extension of the assortment of manufactured finished products with respect to the limited deformability of the above mentioned material in the industrial processing process.

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OPTIMIZATION OF PROCESSES FOR STEEL STRUCTURES CLEANING AND COATING THROUGH INTEGRATED MANAGEMENT SYSTEM

Authors:

mgr inż. Andrzej Brandt , mgr inż. Małgorzata Nowowiejska, mgr inż. Błażej Szewczyk,

mgr inż. Zdzisław Karasowski

Agencja Anticorr Sp. z o.o.

Keywords: steel structure, cleaning, metallization, painting, management

Abstract:

Along with the dynamic development of the metal industry and, consequently, increased competitiveness, it has become very important to ensure proper quality standards and reduce costs. To meet these requirements, the Anticorr Agency proposes a new product, the AnticorrSterMal program, whose task is to computer-assisted cleaning and coating of metal elements, both with organic and metal coatings. The essence of the AnticorrSterMal program is control and supervision of all processes within the plant - both technologically and logistically and concerning broadly understood anti-corrosion.

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HOW TO CHOOSE THE COLOR OF CONSTRUCTION TO MAKE IT DURABLE

Authors:

Damian Wojda, Izabela Kunce

Instytut Badawczy Dróg i Mostów

Keywords: PUR topcoat, UV weathering, colour measurement

Abstract:

The topcoat not only serves as an anti-corrosion protection, but is also responsible for the aesthetics of the building. Due to the degradation of polymeric materials and pigments under the influence of aggressive factors such as UV radiation, humidity or elevated temperature, it is important to select the coating to the expected exploitation conditions. The following article focuses on discussing the durability of the colour of the topcoat and indicates which colours will allow us to maintain the aesthetics of our structure for a longer period of time.

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IMPACT OF ENVIRONMENTAL LOADS AND SPECIFIC ACTIONS ON REINFORCED CONCRETE MARITIME STRUCTURES

Author:

dr inż. Tomasz Mioduszewski

Pracownia Projektowa Budownictwa Hydrotechnicznego Aquaprojekt Sp. z o.o.

Keywords: corrosion, maritime structures, environmental loads

Abstract:

Maritime structures are located in an environment in which specific working conditions prevail. These conditions are characterized by a strong impact on engineering structures. The complexity of the problem (combination of loads and actions) is rarely found in the other reinforced concrete structures, hence the specific requirements for marine constructions. This article presents characteristic impacts and loads of which maritime constructions are exposed. Attention was focused on impacts and combinations of characteristic interactions. It was shown how salty sea water can have an impact on marine constructions, illustrated the mechanical impact of ice cover and other loads. In addition, the destructive role of cyclic change in environmental conditions was indicated on the example of the water surface fluctuation in port basins.

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PRINCIPLES OF REPAIRING REINFORCED CONCRETE STRUCTURES ACCORDING TO PN-EN 1504, PRACTICE IN POLAND ON THE EXAMPLE OF BRIDGE STRUCTURES AND MULTI-STOREY CAR PARKS

Author:

mgr inż. Tomasz Kordjak

Diagnostyka i Naprawy Konstrukcji, Warszawa

Keywords: concrete bridges, multi storey car parks, chloride corrosion, reinforcement corrosion, protection against corrosion of reinforcement, concrete repair

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CHLORIDE-INDUCED CORROSION OF STEEL IN CONCRETE - EFFECTIVE AND APPARENT CHLORIDE DIFFUSION COEFFICIENT

Authors:

R. Filipek* , K. Szyszkiewicz-Warzecha* , A. Królikowska#

*AGH Akademia Górniczo-Hutnicza, Wydział Inżynierii materiałowej i Ceramiki

Instytut Badawczy Dróg i Mostów w Warszawie

Keywords: chloride diffusion coefficient, chloride binding, chloride induced passivity breakdown reaction-diffusion equations, diffusion test, migration test

Abstract:

Corrosion of steel reinforcement elements in concrete is a serious problem having impact on the durability and safety of reinforced concrete structures. One of the most aggressive chemical species is the chloride ion acting through a general mechanism of depassivation of reinforcement surfaces. Chloride ions can diffuse through the water filled net of concrete pores and reach the reinforcement, so the ability to estimate the chloride ion diffusivity in concrete material is extremely important. The paper presents some experimental methods for determining the chloride ion diffusion coefficients in concrete and a short review of theoretical models describing the phenomena of ion transport in concrete. Differences between effective and apparent chloride ion diffusion coefficient are discussed. In particular, diffusion and electro-migration methods are presented.

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SHOTCRETING AS AN EXAMPLE OF AN EFFECTIVE TECHNOLOGY FOR PREVENTING THE CORROSION AND EROSION OF REINFORECED CONCRETE, BRICK AND OTHER SURFACES

Author:

mgr inż. Włodzimierz Majchrzak

SPB „TORKRET" sp. z o. o., sp. Komandytowa

Keywords: SHOTCRETING

Abstract:

The paper discusses the basic types of shotcreting, their applications, as well as the effectiveness of the method in protecting existing concrete, reinforced concrete, and brick structures against corrosion. Example uses of the technology were provided, such as securing rock surfaces and excavations or tunnel construction. The application of the shotcrete technology in new, thin-walled structures was discussed using the example of the curvilinear wall built in 2012 in the POLIN Museum of the History of Polish Jews in Warsaw.

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DURABILITY OF CONCRETE ACCORDING TO THE CODE PN-EN 206+A1:2016- 12 AND ITS NATIONAL APPENDIX PN-B-06265:2018-10

Author:

Maciej Gruszczyński

Politechnika Krakowska, Stowarzyszenie Producentów Betonu Towarowego w Polsce

Keywords: corrosion, concrete, durability

Abstract:

Presently, the basic determinant for concrete quality constitutes not the compressive strength but its long-term durability in complicated environmental conditions and especially for the case of action of temperatures variable in sign and de-icing agents onto the structure. The above thesis guided the authors of the code PN-EN 206+A1:2016-12 and its national appendix PN-B-06265:2018-10, adjusting the European codes regulations into local conditions. 2 In the paper there are presented the basic assumptions and steps that should be taken by concrete mix designer in order to ensure the adequate durability of material. Those information were confronted with the requirements of the largest investor in Poland – General National Roads and Motorways Management, which were included in the document published this year titled “Implementation conditions and acceptance of construction works – concrete in road engineering structures”.

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WEAR MECHANISM FOR PROTECTIVE COATINGS USED FOR PROTECTING BOILER INSTALLATION COMPONENTS

Authors:

Krzysztof Szymański, Dawid Niemiec

Politechnika Śląska

Maciej Szpak, Energo-Coating Sp. z o.o

Łukasz Augustyński , ROSA Łukasz Augustyński

Keywords: corrosion, erosion, protective coatings, durability

Abstract:

The article presents the basics of using thermally sprayed coatings in the protection of boiler plant components, shows their example applications and examples of protective coatings wear. An attempt was made to analyze the causes and mechanisms of coating wear. The possibilities of conscious forecasting of the durability of energy devices based on operational experience gained by the authors of the publication were pointed out.

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ANTICORROSIVE PROTECTION OF THE FIRST AND SECONDARY CONSTRUCTIONS IN THE POWER PLANT USING AS FUEL COAL AND GASSTEAM POWER PLANT

Author:

mgr inż. Andrzej Miodek

Keywords: corrosion, anticorrosion protection, corrosion risk, climat conditions, coatingsrenovation

Abstract:

The paper discusses the specificity of anticorrosive work in the example of two newly-built blocks of power plants powered by different fuel types: coal-fired power plant and gas-steam power plant. The conditions during the application of coatings and the handicapping resulting from the work of the working object are shown.

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COATINGS FOR ANTI-CORROSION PROTECTION MANUFACTURED BY THERMAL SPRAYING METHODS

Authors:

Krzysztof Szymański, Politechnika Śląska

Łukasz Augustyński, ROSA Łukasz Augustyński

Marek Gdesz, BT- Gdesz Marek

Keywords: corrosion, metallization, protective coatings, Zn and Al coatings

Abstract:

The article presents examples of zinc coatings produced by various thermal spraying methods, aspects of effective implementation of anti-corrosion coatings are indicated. advantages and disadvantages of thermal spraying technology in relation to corrosion protection were indicated..

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ENVIRONMENTALLY SAFE PHOSPHATING PROCESS FOR ALUMINIUM ALLOYS

Authors:

Lech Kwiatkowski*, Anna Kapuścińska*, Rafał Lutze*

* Sieć Badawcza Łukasiewicz – Instytut Mechaniki Precyzyjnej

Keywords: corrosion, 2024 Al alloy, conversion coating, electrochemical phosphating, selective/brush plating, protective properties, voltammetry

Abstract:

A method of formation of phosphate coatings on the surface of 2000 series aluminium alloys was developed by means of selective method under low-voltage DC signal. The problem of phosphate ion emissions into the environment was minimized. Structural studies have shown that the chemical content and phase composition of the coatings obtained by the selective method is identical to the coatings obtained in the immersion process. The main phase of the coating is zinc phosphate (hopeite) with the formula Zn3(PO4)2·4H2O. Differences occur in the form and size of crystals. Corrosion resistance assessed by electrochemical methods showed a higher resistance of the layer obtained by the selective method in comparison to immersion method.

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COATINGS FOR PROTECTION AGAINST THE WEAR OF MACHINE PARTS MADE BY WELDING AND THERMAL SPRAYING METHODS

Authors:

Krzysztof Szymański, Politechnika Śląska

Ewa Jonda, Politechnika Śląska

Wojciech Szymański, Thermal Spray & Coating

Keywords: wear, regeneration of parts, protective coatings, durability

Abstract:

The article presents examples of the use of thermal spraying and PTA surfacing processes for the production of machine parts with high performance properties and their regeneration. Advantages of processes and the effects of their application were pointed out.

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PROTECTIVE COATINGS USED IN THE PRODUCTION OF AGRICULTURAL MACHINERY

Authors:

Bartosz Zubrzycki, Metal-Fach Sp. z o.o

Keywords: corrosion, agricultural machinery, life cycle of equipment used for agricultural production

Abstract:

Currently, the requirements set for agricultural machinery by their users have forced manufacturers of agricultural equipment to invest large forces and resources in the protective coating departments and in the qualifications of the personnel operating and supervising these departments. In the following paper you can find out about the currently used techniques for surface preparation and corrosion protection used in the Polish agrotechnical industry. This document presents information on how the approach and expectations of users and manufacturers have changed to the subject of corrosion protection and data on why some products are designed and manufactured in accordance with the requirements of class C5 according to the requirements of ISO 12944.