

Marcin Garbacz: Influence of an Increased Controlled Dose of Irradiance on the Change of Selected Physicochemical Properties of Paint Systems Used in Rolling Stock

The article presents the results of ageing tests with the use of laboratory light radiation tested according to the EN ISO 16474-2 standard for painting systems used in rolling stock. The influence of aging on such properties as gloss, colour and hardness, was determined using two different irradiance settings of the order of 60 W/m² and 120 W/m² for the wavelength 300÷400 nm and the same levels of radiant exposure. In addition, this study describes the most important information about laboratory aging tests with simulation of sunlight, temperature, moisture including rain, which are included in ISO standardised test methods. The influence of weather parameters has been described, in particular the influence of an increased dose of irradiance on the degradation of selected physicochemical properties of coatings and the possibility of the predicted ageing progress (changes in selected properties). The obtained results of laboratory tests allow to make certain assumptions regarding the increase of the dose of irradiance and thus the shortening of the laboratory testing time in the context of the assessment of the most desirable properties of the coating for a given application with the use of laboratory ageing tests.

Keywords: accelerated weathering, xenon-arc radiation, paint coatings, irradiance, radiant exposure, hardness, gloss, colour, rolling stock

Marek Graff: Evolution of Electric Traction Vehicle Design Based on the Example of Škoda Locomotives

The article describes the evolution of Škoda electric locomotives, starting with vehicles supplied with 3 kV DC and 25 kV 50 Hz, initially featuring a resistor start-up (for DC supply), optionally high-voltage voltage regulation (for AC supply), and later with a pulse (thyristor) start-up. The railway network in Czechoslovakia was initially electrified with direct voltage (including the Prague junction); however, learning the advantages of the 25 kV 50 Hz voltage developed in Germany led to some new sections of the ČSD network being electrified with alternating current. At the same time, Czechoslovakia's national manufacturer Škoda developed vehicles (locomotives, EMUs) suitable for DC and AC operation. Initially, these were single-system vehicles, as the development of multi-system ones was technically complicated at the time (only short-series production was practiced). The advent of pulse-starting traction motors not only provided more economical and simpler traction motor control but also simplified the construction of multi-system vehicles. The article discusses the specifics of both engine start-up systems and the evolution of DC and AC vehicle design and operation.

Keywords: locomotives, Škoda, electric motor start, thyristor, transistor, GTO, IGBT, ČD, ŽSR, ČSD

Władysław Koc: Determination of Moving Chord Length for Determining the Curvature of In-Service Railway Track

The paper deals with the still unexplained issue of the choice of chord length, which will be the most beneficial when determining the horizontal curvature of railway track with the use of the moving chord method. In the railway track – with an incorrect choice of the chord length – the horizontal track deformations and coordinate measurement error may cause

irregular curvature diagrams, which will be difficult to interpret. The study analysed three test geometric layouts adapted to the speeds of 80 km/h, 120 km/h and 160 km/h (the radii of circular curves determined as a result of the curvature estimation performed were approximately 410 m, 880 m and 1480 m, respectively). The lengths of the moving chord in the range of 10÷50 m were considered. On the basis of the conducted analysis, it was unequivocally demonstrated that the chord length used to determine the curvature in the railway track should depend on the value of the radius of the circular curve. Approximate lengths l_c were proposed depending on the range of the RCA radius. The adaptation of the moving chord method to the adopted measurement procedure presented in this paper and the way of using the obtained curvature diagram, provide the appropriate application basics.

Keywords: railway track, curvature of the track axis, the moving chord method, applications

Dariusz Kowalczyk: Testing of Railway Prestressed Concrete Sleepers Using Acoustic Emission

The article describes the tests of prestressed concrete sleepers made according to the method specified in the requirements of the European standards (EN 13230-2:2009 Railway applications – Track – Concrete sleepers and bearers – Part 2: Prestressed monoblock sleepers) and WTWiO regulations, and an additional measurement method was used – acoustic emission (AE). The purpose of the tests using the acoustic emission method was to verify the results obtained using other test methods described in the European standard. The use of this method in sleeper tests enables obtaining precise data from the sleeper load test and determination of the characteristic parameters based on the recorded AE signals. Due to the variety of existing sleepers and the development of products in this area: wooden sleepers, composite sleepers, steel sleepers (type Y), the use of the acoustic emission method in research will be a good support and will enable proper assessment of these elements of the railway road.

Keywords: test sleepers, acoustic emission, crack

Andrzej Zbieć: Aerodynamic Phenomena Caused by the Passage of a Train. Part 4: Pressure Influence on People

In the series of articles describing the aerodynamic phenomena caused by the passage of a train, the effects of a train running at high speed on itself, on other trains, on objects on the track and on people are characterised. This impact can be of two types – generated pressure and slipstream. Apart from the literature analysis, the author's research is also taken into account. The forth part presents the influence of pressure on people.

Keywords: rolling stock, high speed railways, aerodynamic phenomena