внутри поездной связи, которые должны сохранят работоспособность в условиях пожара, класс пожарной опасности должен быть не ниже П1б.7.1.2.1 и П1б.7.2.2.2; для основного освещения и других электрических цепей, проложенных в кабине машиниста и пассажирских салонах, которые отключаются при аварийных ситуациях, класс пожарной опасности должен быть не ниже П1б.8.1.2.1 и П1б.8.2.2.2; для электрических цепей, проложенных вне кабины машиниста и пассажирских салонов, класс пожарной опасности должен быть не ниже О1.8.2.5.4 и П1б.8.2.5.4.

Методы испытания и применяемое оборудование при проведении испытаний показателей пожарной опасности должны соответствовать требованиям ГОСТ 33326–2015 «Кабели и провода для подвижного состава железнодорожного транспорта. Общие технические условия» и ГОСТ 26445–85 «Провода силовые изолированные. Общие технические условия»: показатель нераспространения горения – для категории А; показатель дымообразования при горении и тлении кабельных изделий – по ГОСТ IEC 61034-2–2011 «Измерение плотности дыма при горении кабелей в заданных условиях. Часть 2. Метод испытания и требования к нему»; коррозионная активность продуктов дымогазовыделения при горении и тлении полимерных материалов кабельных изделий – по ГОСТ IEC 60754-1–2015 «Испытания материалов конструкции кабелей при горении. Часть 1. Определение количества выделяемых газов галогенных кислот» и ГОСТ IEC 60754-2–2015 «Испытания материалов конструкции кабелей при горении. Часть 2. Определение степени кислотности выделяемости газов измерением pH и удельной проводимости»; токсичность продуктов горения – по ГОСТ 12.1.044–2018 «Система стандартов безопасности труда. Пожаровзрывобезопасность веществ и материалов. Номенклатура показателей и методы их определения». При оценке коррозионной активности в процессе испытаний определяется также количество выделяемых газов галогенных кислот по ГОСТ IEC 60754-1 и степень кислотности выделяемых газов измерением pH и удельной проводимости по ГОСТ IEC 60754-2. При оценке показателя дымообразования определяется плотность дыма при горении кабелей в заданных условиях по светопроницаемости по ГОСТ IEC 61034-2.

Таким образом, при наличии материалов, которые доказывают соответствие кабельной продукции вышеуказанным требованиям, можно делать вывод о соответствии электропоездов подпункту «п» пункта 5 статьи 4 ТР ТС 001/2011 в части применяемой кабельной продукции.

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VERIFICATION OF TRACTION POWER SUPPLY SYSTEM ON THE ROUTE WARSAW – GDANSK

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Reliable and efficient transport is and will be at the center of technical policy. Considering the fact that a significant part of the fuel and energy resources is consumed by the transport complex, the energy security of the state depends on its efficiency. In Poland, transport is developing steadily on the basis of intermodal approach. As a part of this process it's planned to build a Central Communication Port (CPK) (Solidarity Transport Hub, STH), an interchange between Warsaw and Lódź, integrating air, rail and road transport. The CPK will also include railway investments: a hub in the immediate vicinity of the airport and connections within the country that will allow travel between Warsaw and the largest Polish cities in no more than 2,5 hours. Airport City is also to be built in the CPK area, which will include trade fair, congress and conference facilities [1].

The railway part of the CPK Program, which is divided into stages for implementation by 2040, is a web of new lines leading from 10 directions to CPK and Warsaw. As a result, its arrival by train to the central airport is to take no more than 2 hours. The network will cover the largest cities in the country (except Szczecin, which we can reach comfortably by rail within 3 hours 15 minutes due to the distance). Easy access to the CPK will also cover the border areas of the Czech Republic, Slovakia, Ukraine, Belarus, Lithuania and the Kaliningrad Region [2, 11].

Among these works, an important part is the admission of railway lines for high-speed traffic. Currently Railway Research Institute is evaluating the possibility to begin the operation of trains at a speed of 200 km/h on line no. 9 Warsaw – Gdansk. This report presents methodological approaches to this issue.

The railway line no. 9 is part of the E65 line belonging to the 6th Pan-European Transport Corridor, connecting the Baltic regions with areas on the Adriatic Sea and the Balkans. The E-65 line, running through Gdynia, Warsaw, Katowice, the Wisla Bridge and Zebrzydowice, is over 720 km long. The railway line no. 9 has a length of 323 333 km, and connects the Warszawa Wschodnia station with the «Gdańsk Główny» station. The entire line has been electrified since 1985. Formally, on the Warsaw – Gdynia route prior to modernization, the speed was 120 km/h, but on many sections train speed limits were introduced due to the geometry of the route and the condition of the track. The modernization of the Warsaw – Gdansk line has been divided into several projects [3]. Figure 1 shows the railway line nr 9 Warszawa – Gdansk.

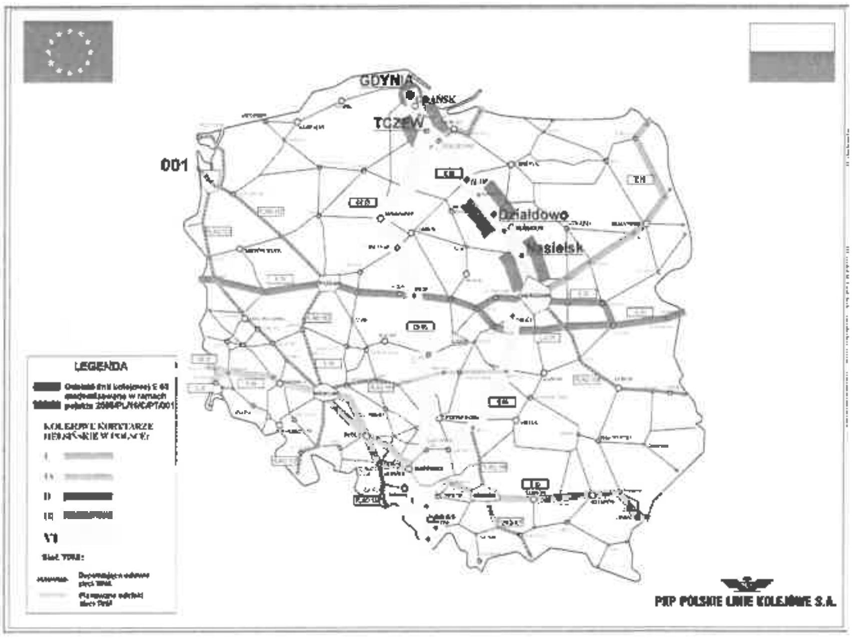

Figure 1 – The railway line no. 9 Warszawa – Gdansk

The assumptions for the modernization of the E65 railway line on the Warszawa Wschodnia – Gdynia section provided for achieving speeds of up to 160 km/h for conventional rolling stock and 200 km/h for rolling stock with tilting body on some sections of the line. Based on these assumptions and based on the Feasibility Study, construction projects were developed and comprehensive modernization of the E65 railway line started. The construction documentation constituting the basis of this modernization took into account the maximum speed up to 160 km/h for classic rolling stock. In addition, on sections planned in the study for speeds greater than 160 km/h, the process of liquidation of intersections at the rail level was initiated, which is a necessary condition for a possible increase in speed to 200 km/h.

The authors verified the types of traction lines on sections where it is planned to increase the speed above 160 km/h, the gauge (horizontal and vertical), traction line maintenance plan. The existing maintenance plan was analyzed for compliance with the current normative document Iet-2 "Traction line maintenance instructions" and Iet-107 "Design guidelines and conditions for the acceptance of overhead contact lines" taking into account the standards and requirements for interoperable lines, in particular local wire wear; contact wire suspension height; difference in contact wire suspension height between adjacent suspensions; maximum inclination of the contact wire relative to the track plane; use of electrically conductive hangers, contact line switches. A simulation to assess the power efficiency of the traction power supply system in connection with increasing the maximum speed on the railway line to 200 km/h was made based on the requirements specified in the standard EN 50388: 2012.

On the basis of analyzes and calculations of the operation of the traction power supply was assessed the efficiency and quality of power supplies – minimum allowable time between trains, maximum train current consumed by the train, timetable and planned maintenance activities, mean useful voltage. After determining the above conditions were identified 'bottlenecks' – places that do not meet the requirements set out in documents (e. g. TSI Energy) – and determined the necessary actions to eliminate them.

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