

# The impact of European Registers of Road Transport Undertakings on security and enforcement of the system of digital tachograph

M Rychter<sup>1</sup> and R Rychter<sup>2</sup>

<sup>1</sup> University of Life Sciences in Lublin, Faculty of Production Engineering  
28 Głęboka St., 20-612 Lublin, Poland

<sup>2</sup> Łazarski University, 43 Świeradowska St., 02-662 Warsaw, Poland

E-mail: <sup>1</sup>rychter@poczta.fm and <sup>2</sup>Renata.Rychter@interia.pl

**Abstract.** Secure digital tachograph system is indisputably a means having the great influence on road safety, enforcement of the social conditions for drivers in road transport as well as supporting the fair competition between road transport undertakings. In order to better monitor the compliance of road transport with the rules in force, inter alia the provisions on usage the digital tachographs, the European Union regulation introduces the European Registers of Road Transport Undertakings (ERRU), a system that allows a better exchange of information between Member States. The main purpose of this analysis is to present the measures for enforcement the execution of the provisions on obligation of installation and usage of digital tachographs in road transport and for improving the security of data recorded within digital tachograph system especially through exchange of the information on the most serious infringements committed by hauliers in any Member State, which may lead to the loss of good repute and the e-document engineering method used by the ERRU system.

## 1. Introduction

The success of the digital tachograph system, introduced in member states of the European Union by the Council Regulation (EC) No 2135/98 of 24 September 1998 amending Regulation (EEC) No 3821/85 on recording equipment in road transport and Directive 88/599/EEC concerning the application of Regulations (EEC) No 3820/84 and (EEC) No 3821/85<sup>1</sup> since 1 of May, 2006, is the guarantee of fair competition and enforcement of legal provisions on common rules on admission to the occupation of road operator and social rules of drivers. The usage of digital tachograph has undoubtedly a crucial role to play in improvement of road safety, because the main target of the tachograph is the observance of driving and rest times and speed limits. The effects of road accidents involving motor vehicles or set of vehicles for the actual total laden weight of over 3,5 tones used in the carriage of goods by roads; often vehicles carrying dangerous goods or vehicles used for passenger carriages, are much more harmful in terms of both economic and social than accidents with the participation of so called: light vehicles (the

<sup>1</sup> Official Journal L 274, 09.10.1998, p. 1



total laden weight of less than 3,5 tones). For that reasons, the development of the safe digital tachograph system shall be one of the main purposes of the enforcement policies of the member states in the range of road transport, *inter alia* because of the permanent and fast technical progress and high risk of installation of unpermitted devices used for manipulation of the records of such equipment. European Register of Road Transport Undertakings (ERRU) performs both auxiliary and monitoring function regarding the digital tachograph system. This linked-up database, operating since 1 January 2013, allows better monitoring of the compliance of road transport undertakings with the rules of using digital tachographs. Undertakings that do not respect the provisions on digital tachographs will face the consequences in the Member State where they are based. They can lose their good repute and access to the road transport market. The well balanced and parallel system based on digital tachograph system and ERRU is a kind of “squeeze-out mechanism” for unfair road transport operators, from the market of professional road carriages.

## **2. The safety of digital tachograph system**

Undoubtedly, the tools for the prevention of accidents in the course of commercial road transport of heavy vehicles should be created and developed. Digital tachograph system is one of such tools, giving the opportunity to the completed and successful monitoring of periods of drivers' activity and speed of driving during conducting road carriage. The technical progress undermines the possibility to build a model of digital tachograph system fully secure from the point of view of data recorded by such system. The natural consequence is the need for recommendations on technical requirements for digital recording equipment in road transport, which would prevent manipulating of data recorded by this device. Security of digital tachograph system is unquestionably one of the most important elements affecting effectiveness of this system. The methodology of prevention and technical solutions in order to eliminate and decrease the reaction of prohibited devices, manipulating data, recorded in register equipment, has a crucial role.

To ensure the safety of data stored and processed within the framework of the digital tachograph system it is also necessary to use the knowledge and technology of cryptology. Data security has a long tradition in the automotive industry. However, the issue of data security and protection against attempts to falsify or delete is still little known in the environment of manufacturers and suppliers of motor vehicles, which are used for road transport and in which recording devices should be installed. Cryptography plays a significant role for the security of the digital tachograph system. Mechanisms and importance of cryptography should be respected by each participant of digital tachograph system. Data encryption mechanisms are correspondingly important in connection with the introduction of the obligation to apply the intelligent digital tachographs and the ability to copy data from the recording equipment using the interface and electronic communication.

Fitters and workshops play an important role in the security of tachographs. Important role in the process of testing, periodic checks and calibration of digital recording equipment plays a suitable quality level of training of technicians in workshops and the quality of tests and examinations carried out by workshops.

## **3. The smart tachograph**

Bearing in mind the significant meaning of control functions of digital recording equipment, it was necessary to develop technical solutions, enabling remote control of digital recording equipment, using intelligent transport systems, including the global GPS location system (Global Positioning System). Changes in European legislation, according to the provisions of regulation (EU) No 165/2014 of the European Parliament and of the Council of 4 February 2014 on tachographs in road transport, repealing Council Regulation (EEC) No 3821/85 on recording equipment in road transport and amending Regulation (EC) No 561/2006 of the European Parliament and of the Council on the harmonisation of certain social legislation relating to road transport<sup>2</sup>, confirmed the legitimacy and desirability of

---

<sup>2</sup> OJ L 60, 28.2.2014, p. 1.

researches conducted by and obtained as a consequence of their results, including, in particular, in the scope of use of recording equipment, connected to the global satellite navigation system, as a means of enabling the automatic registration of the vehicle's position and supporting the control function of the system.

With regard to the communication on the distance between the recording equipment, digital tachograph system plays a significant role in enforcement instrument for control services, authorized to the road side checks and inspections at the premises of undertakings.

Consideration for the fair competition and conducting the commercial activity regarding to the regulations of existing Community law require the uniform application of common rules. The scale of conducted carriages by road at the global level of the economic market of the European Union brings the need of closer monitoring of compliance with the regulation on road transport throughout imposing on the transport operators and drivers the obligation of the implementation of the digital recording devices and making records of drivers' activities. Because of the safety reasons in road transport the obligation of registration of rests and driving periods as well as records of journey and speed of driving have the special meaning. Experience with the use of analogue recording devices has presented the serious unreliableness of the monitoring system of working time of drivers in road transport, based on such analogue devices. Digital recording equipment and multi-element, completed system based on digital data gives the opportunity to monitor the compliance with legal provisions on driving and rest periods, as well as it allows to reconstruct the history of carriages conducted by the driver.

In 2019, a new generation of digital tachograph (the smart tachograph) will be introduced on the market, and will be mandatory for all newly registered commercial vehicles. Within next fifteen years, the smart tachograph will be mandatory for all commercial vehicles in the scope of the tachograph regulation, operating within the territory of European Union. Once operational, one of the functions of the smart tachograph will be to automatically record the exact geo-positioning of vehicle and driver at the start and the end of the driver's working day, as well as every three hours of cumulated driving time. This information will be stored in a secure way both on-board vehicle and at the company site, as requested by the EU rules, and thus will be downloadable both during roadside and company checks. This certain tachograph function will be essential in controlling the period of time over which vehicle and driver operated on a territory of a given Member State.

Hence, suitable worked out and developed, allowing work in on-line mode, the system of intelligent digital tachograph shall eliminate the infringements in road transport in the range of rules on driving and rest periods for drivers. This only will be achieved under the condition of compatible functioning of ERRU and registering of all cases of infringement against tachograph rules, which cause the loss of good repute of transport manager of road transport operator. Furthermore, to provide the security of data recorded and stored in digital tachograph system, it must be ensured the permanent monitoring of the level compliance with the provisions of European Union law on road carriage and social rules for drivers. Intelligent tachograph system will be the necessary and effective method for control of compliance with the good repute condition in road transport and for risk estimation of the infringements concerning the provisions on working time rules for drivers. Consequently, strengthening the effectiveness of the certain elements of digital tachograph system and providing its interoperability, as well as the data security against its loss and change, will create the good instrument, countering the road accidents, collisions and improving social conditions for the drivers. It directs to the statement on the same resonance of the digital tachograph system and ERRU.

#### **4. Legal bases and obligation of arrangement of the national registers and their interconnection**

##### *4.1 National registers as enforcement tool of common rules on access to the road transport market*

Provided by every member state in European Union, national electronic registers should perform subsidiary role for the enforcement<sup>3</sup> of regulation (EC) No 1071/2009 of the European Parliament and

---

<sup>3</sup> Strachowska R., *Komentarz do art. 16 rozporządzenia nr 1071/2009 ustanawiającego wspólne zasady dotyczące warunków wykonywania zawodu przewoźnika drogowego*, Lex/el. 2013.

*of the Council of 21 October 2009 establishing common rules concerning the conditions to be complied with to pursue the occupation of road transport operator and repealing Council Directive 96/26/EC.*<sup>4</sup> Pursuant to article 16 paragraph 1 of regulation 1071/2009, for the purposes of the implementation of this regulation, in particular articles 11 to 14 and Article 26, each Member State shall keep a national electronic register of road transport undertakings which have been authorised by a competent authority designated by it to engage in the occupation of road transport operator. The data contained in that register shall be processed under the supervision of a public authority designated for that purpose. The relevant data contained in the national electronic register shall be accessible to all the competent authorities of the Member State in question.

The obligations of the member states regarding the national electronic registers covers the task of recording in the register the data relating to undertakings which it authorises; in order to improve transparency and to allow the client of a transport undertaking to verify whether that undertaking is in possession of the appropriate authorisation, certain data contained in the national electronic register are publicly accessible.

According to article 16 paragraph 2 of regulation 1071/2009 national electronic registers of road transport undertaking shall contain, inter alia, the number, category and type of serious infringements, which have resulted in a conviction or penalty during the last 2 years.

Even though the obligation of introducing the national register of road transport undertakings has no derogations, Poland has not implemented in national law the appropriate provisions on such register.<sup>5</sup>

## **5. Infringements regarding usage of digital tachographs as the most serious infringements in road transport**

### *5.1. Definition of serious infringements*

The regulation 1071/2009 does not define the term “serious infringement.” Nevertheless, pursuant to article 2 point 7 of *regulation (EC) No 1072/2009 of the European Parliament and of the Council of 21 October 2009 on common rules for access to the international road haulage market Text with EEA relevance*<sup>6</sup> “serious infringement of Community road transport legislation” means an infringement which may lead to the loss of good repute in accordance with article 6 of regulation 1071/2009 or to the temporary or permanent withdrawal of a Community licence.

Furthermore, in the absence of EU specific provisions in the regard, which serious infringements of European law applies to the transport manager and which to the undertaking, it is a matter of national (criminal or administrative) legislation to determine the active subject of infringements to the road transport legislation.<sup>7</sup> Article 6 of regulation 1071/2009 provides that when assessing the good repute of an undertaking the Member State should assess the undertaking itself, the transport manager and any other relevant person as may be determined by the Member State. Member States have got the delegation to determine the conditions to be met by undertakings and transport managers in order to satisfy the requirement of good repute, one of the conditions of the access to the occupation of the road transport operator. Serious infringements include convictions, penalties or infringements of national rules in force

<sup>4</sup> OJ L 300, 14.11.2009, p. 51 – 71.

<sup>5</sup> According to the project of amendments of law on road transport of, accepted by the Cabinet of Ministers on 12 of April, 2016 and addressed to the Polish Parliament, in Poland until April 2017 the National Electronical Register of Road Transport Undertakings will be created and connected to ERRU. The Polish register will be administrated by the General Inspector of Road Transport and will consists of three data bases: register of road transport operators, possessing permission on occupation of the road transport operator, the evidence of persons without skills on management of road transport operations and register of serious infringements in road transport.

<sup>6</sup> Official Journal L 300, 14.11.2009, p. 72 – 87.

<sup>7</sup> European Commission, *FREQUENTLY ASKED QUESTIONS RELATING TO THE IMPLEMENTATION OF ERRU (Electronic Register of Road Transport Undertakings), Regulation (EC) No 1071/2009*, 2013, <http://ec.europa.eu/transport/modes/road/access/doc/faq-on-erru.pdf>.

in the fields of: commercial law, insolvency law, pay and employment conditions in the profession, road traffic, professional liability, trafficking in human beings or drugs.

Additionally, the term “serious infringements in road transport” means that the transport manager or the transport undertaking have not in one or more Member States been convicted of a serious criminal offence or incurred a penalty for a serious infringement of Community rules relating in particular to: the driving time and rest periods of drivers, working time and the installation and use of recording equipment, the maximum weights and dimensions of commercial vehicles used in international traffic, the initial qualification and continuous training of drivers, the roadworthiness of commercial vehicles, including the compulsory technical inspection of motor vehicles, access to the market in international road haulage or, as appropriate, access to the market in road passenger transport, safety in the carriage of dangerous goods by road, the installation and use of speed-limiting devices in certain categories of vehicle, driving licences, admission to the occupation, animal transport.

Most infringements listed in Annex IV are by their nature committed by drivers. For instance, in the case of breach of EU rules on driving times, breaks and rest periods established by Regulation (EC) No 561/2006, the transport undertaking is liable for infringements committed by drivers (article 10 paragraph 3) unless competent authorities in Member State establish that there is an evidence that the undertaking cannot be reasonably held responsible (the transport undertaking complied with requirements of article 10 paragraph 2 of this regulation to organise the work of drivers, to properly instruct them, to check compliance with the provisions of the regulation). Such a principle of responsibility of the undertaking for the illegal acts of the driver could be applied in the same way to other infringements referred to in Annex IV when assessing the good repute of the undertaking. Such serious infringement, which was mentioned in point 2 of the annex IV to regulation 1071/2009, is referred to the digital tachograph system – not having a tachograph or using a fraudulent device able to modify the records of the recording equipment or falsifying record sheets or data downloaded from the tachograph and/or the driver card.<sup>8</sup>

### 5.2. Categories and seriousness of serious infringements

Pursuant to the article 6 paragraph 2 letter b of regulation 1071/2009, the European Commission is obliged to draw up a list of categories, types and degrees of seriousness of serious infringements of Community rules which, in addition to those set out in Annex IV of regulation 1071/2009, may lead to the loss of good repute. A common list of categories, types and degrees of serious infringements of the European Union rules in the commercial road transport, in addition to those set out in Annex IV to regulation 1071/2009, which may lead to the loss of good repute of a road transport operator, was pointed by *the European Commission regulation 2016/403 of 18 March 2016 supplementing Regulation (EC) No 1071/2009 of the European Parliament and of the Council with regard to the classification of serious infringements of the Union rules, which may lead to the loss of good repute by the road transport operator, and amending Annex III to Directive 2006/22/EC of the European Parliament and of the Council*.<sup>9</sup> Categorisation of serious infringements is presented in annex I to the regulation 2016/403 in division into twelve tables, containing categories and types of serious infringements against the EU rules in commercial road transport, separated into three categories of seriousness (MSI = most serious infringements/VSI = very serious infringement/SI = serious infringement), according to their potential to create a risk of fatalities or serious injuries.

Groups of infringements regarding digital tachograph system, against *regulation (EU) No 165/2014 of the European Parliament and of the Council of 4 February 2014 on tachographs in road transport, repealing Council Regulation (EEC) No 3821/85 on recording equipment in road transport and*

<sup>8</sup> Regarding to frauds and manipulations on digital tachographs, see more: M Rychter, 2011 2012 Budowa i zastosowanie systemu tachografii cyfrowej Warszawa; M Rychter, SAE Technical Paper, Directions of Counteracting Manipulations of Digital Recorders in the Light of the Safety Functioning of the Digital Tachographs System, 2013, No 1, p. 9.

<sup>9</sup> OJ L 74, 19.03.2016, p. 8.

*amending Regulation (EC) No 561/2006 of the European Parliament and of the Council on the harmonisation of certain social legislation relating to road transport*<sup>10</sup> are categorised in table 2 of annex I to regulation 2016/403. As most serious infringement (MSI), concerning the installation of tachograph, was defined: “not having type-approved tachograph installed and used (e.g.: not having a tachograph installed by fitters, workshops or vehicle manufacturers approved by the competent authorities of the Member States, using a tachograph without the necessary seals placed or replaced by an approved fitter, workshop or vehicle manufacturer or using a tachograph without the installation plaque).” Furthermore, the most serious infringements, regarding use of digital tachograph and driver card, are the following five infringements: driving with a driver card that has been falsified (considered as driving without driver card), driving with a driver card of which the driver is not the holder (considered as driving without driver card), driving with a driver card which has been obtained on the basis of false declarations and/or forged documents (considered as driving without driver card), using a fraudulent device able to modify the records of the tachograph, falsifying, concealing, suppressing or destroying data recorded on the record sheets or stored and downloaded from the tachograph and/or the driver card.

The second category of seriousness of infringements, regarding digital tachograph, are very serious infringement (VSI), such as: using a tachograph not inspected by an approved workshop, driver holding and/or using more than one own driver card, tachograph not correctly functioning (e.g.: tachograph not properly inspected, calibrated and sealed), tachograph improperly used (e.g.: deliberate, voluntary or imposed misuse, lack of instructions on correct use, etc.), undertaking not keeping printouts and downloaded data, recorded and stored data not available for at least a year, incorrect use of driver card, unauthorised withdrawal of driver card which has an impact on the record of relevant data, driver card used to cover a period longer than that for which it is intended and data is lost, use drivers card and data not legible, not using manual input when required to do so, incorrect use of switch mechanism, refusing to be checked, unable to produce records of current day and the previous 28 days, unable to produce records of the driver card if the driver holds one, unable to produce manual records and printouts made during the current day and the previous 28 days, unable to produce a driver card, if the driver holds one, tachograph not repaired by an approved fitter or workshop, driver not marking all required information for the periods of time which are no longer recorded while tachograph is unserviceable or malfunctioning.

Only one infringement regarding the digital tachograph was considered in regulation 2016/403 as very serious, that is: driver card not in the correct slot (multi-manning).

The same categorisation of serious infringements dealing with digital tachograph system was introduced in *directive 2006/22/EC of the European Parliament and of the Council of 15 March 2006 on minimum conditions for the implementation of Council Regulations (EEC) No 3820/85 and (EEC) No 3821/85 concerning social legislation relating to road transport activities and repealing Council Directive 88/599/EEC*<sup>11</sup> and the risk assessment system on road transport undertakings for the purposes of road side checks and checks at the premises.

Very important in terms of procedure on analysing the condition of good repute are the provisions of annex II to the regulation 2016/403 on frequency of occurrence of serious infringements. The serious (SI) and very serious (VSI) infringements regarding digital tachographs, when committed repeatedly shall be regarded as more serious by the competent authority of a Member State of establishment. When calculating the frequency of occurrence of repeated infringements Member States shall take into account factors such as: seriousness of infringement (SI or VSI), time (at least one rolling year from the date of a control), number of drivers used for the transport activities managed by the transport manager (average per year). According to the potential of creating a risk to road safety the maximum frequency of serious infringements beyond which they should be considered as more serious shall be established as: 3 SI/per driver/per year = 1 VSI; 3 VSI/per driver/per year = launch of a national procedure on good repute.

<sup>10</sup> OJ L 60, 28.2.2014, p. 1.

<sup>11</sup> OJ L 300, 14.11.2009, p. 51.

The number of infringements per driver per year is an average figure calculated by dividing the total number of all infringements of the same level of seriousness (SI or VSI) by the average number of drivers employed during the year. The frequency formula provides for a maximum threshold for occurrence of serious infringements beyond which they shall be considered more serious. It must be underlined that Member States may establish stricter thresholds if envisaged in their national administrative procedure for assessing good repute. Poland and most of the EU member states have not introduced such national rules. However it must be noted that regulation 2016/403 is the example of new UE legislation and it shall apply from 1 January 2017.

### 5.3. The level of infringements concerning digital tachographs

According to European Commission Staff Working Paper Summary of the Impact Assessment, the biggest part of controlled vehicles is found breaching the social rules. The number of infringements by drivers and road transport operators against the social rules is dangerously high: 3.9 million offences were detected in the period 2011-2012 (4.5 million offences reported in 2009-2010 and 3.3 million in 2007-2008).<sup>12</sup> Approximately one fourth of these are found breaching tachograph rules. On average around 45 000 vehicles are in breach of EU tachograph rules. Such persistent non-compliance with obligations for minimum rest periods and the resulting driver fatigue can be estimated to produce an increase in the societal cost of accidents of close to €2.8 billion.<sup>13</sup>

For that reason, one of the operational objective of the European Commission is to eliminate the "most serious infringements" against tachograph rules by 2020.<sup>14</sup>

Road inspections performed by the Polish Road Transport Inspection presented that in first half of the year 2015 there were 55 869 infringements in road transport, according to the law on road transport. Infringements regarding the usage of tachographs stated 30% of these infringements. Almost 10% of the infringements regarding usage of tachograph is manipulating this recording device.<sup>15</sup> Conversely the structure of infringements indicated as the result of checks at the premises of undertakings in Poland presents approximately 72% of infringements, regarding the improper usage of tachographs.<sup>16</sup> According to the data gathered by the Polish Road Transport Inspections in the whole year 2015, 78% of infringements occurred as the result of checks at the premises of the road transport undertakings were violations concerning usage of tachographs in road transport (147579 such cases).<sup>17</sup>

It must be also underlined that type and sanctions for the same infringement against the rules on tachographs can vary in Member States of EU. Hence, it has got a very negative impact on security of digital tachograph system and the level of road safety. For instance, the infringement "Driving with no type approved recording equipment installed and used" is punished in chosen Member States of EU, within administrative procedure, on very various level of punishment. The level of sanction for this infringement in Germany is very high: fine up to € 15,000 (for undertaking) and up to € 5,000 for a driver. In Austria it is fine up to 2.180 € or up to 3.600 € (for the employer) and fine up to 5.000 € or

<sup>12</sup> European Commission, DG MOVE/D3, *Evaluation of social legislation in road transport (Regulation (EC) No 561/2006 on driving times and rest periods, Directive 2002/15/EC on working time of mobile workers, Directive 2006/22/EC on enforcement)*, Brussels 2015.

<sup>13</sup> European Commission, *Commission Staff Working Paper Summary of the Impact Assessment, SEC/2011/0947 final - COD 2011/0196, 52011SC0947*, eur-lex.europa.

<sup>14</sup> Commission Staff Working Paper, Impact Assessment on measures enhancing the effectiveness and efficiency of the tachograph system Revision of Council Regulation (EEC) No 3821/85. Accompanying the document Proposal for a Regulation of the European Parliament and of the Council amending Council Regulation (EEC) No 3821/85 to enhance the security, effectiveness and efficiency of the tachograph in road transport, Brussels, 2011, p. 28.

<sup>15</sup> Główny Inspektorat Transportu Drogowego, *Informacja dotycząca działalności wojewódzkich inspektoratów transportu drogowego w pierwszym półroczu 2015 roku*, Warszawa 2015, p. 21.

<sup>16</sup> *Ibidem*, p. 59.

<sup>17</sup> Central Evidence of Infringements, 2015.

imprisonment in case of recurrence (for driver and transport operator), whereas in Lithuania the head of undertaking will pay fine up to €869 and the driver - up to €290.<sup>18</sup>

## **6. Conclusions – The legal proposals for strengthening the linkage between ERRU and digital tachograph system**

The perspective *de lege ferenda* concerns the question of procedural unified rules on inspections in road transport under the European Union law and common sanction system for the infringement in road transport regarding the usage of digital tachographs and social rules of drivers. Only the equivalent reaction on the infringement against the union law and the same obligations, rights and rules under the procedural provisions will ensure the necessary countermeasures for frauds and infringements on digital tachograph system. Present European Union regulation 1071/2009 allows Members States to determine the conditions of fulfilling the requirement of good repute. The impact of ERRU on the safety of digital tachograph system and, consequently, the safety in road transport and fair competition will be increased by the unified system of sanctions and procedural provisions of controls. These issues are necessary for elimination of the key harms of the road transport market. Pursuant to the preamble of regulation 1071/2009 this problems are still vital: “distortion of competition and a lack of market transparency and of uniform monitoring, as well as the risk that undertakings employing staff with a low level of professional qualification may be negligent in respect of, or less compliant with, the rules on road safety and social welfare, which may harm the image of the sector.”

## **References**

- [1] European Commission, Commission Staff Working Paper Summary of the Impact Assessment, SEC/2011/0947 final - COD 2011/0196, 52011SC0947, eur-lex.europa
- [2] European Commission Directorate-General for Mobility and Transport 2013 Study on sanctions in the field of commercial road transport, CONTRACT NO 2011/MOVE/D3/ETU/514-2011/SI2.612723 – FINAL REPORT – PART I Brussels p. 36
- [3] Główny Inspektorat Transportu Drogowego 2015 Informacja dotycząca działalności wojewódzkich inspektoratów transportu drogowego w pierwszym półroczu 2015 roku Warszawa.
- [4] Rychter M 2011 2012 Budowa i zastosowanie systemu tachografii cyfrowej Warszawa
- [5] Rychter M, SAE Technical Paper, Directions of Counteracting Manipulations of Digital Recorders in the Light of the Safety Functioning of the Digital Tachographs System, 2013, No 1, p. 9
- [6] Strachowska R 2013 Komentarz do art. 16 rozporządzenia nr 1071/2009 ustanawiającego wspólne zasady dotyczące warunków wykonywania zawodu przewoźnika drogowego Lex/el

---

<sup>18</sup> European Commission Directorate-General for Mobility and Transport, *Study on sanctions in the field of commercial road transport*, CONTRACT NO 2011/MOVE/D3/ETU/514-2011/SI2.612723 - FINAL REPORT – PART I, Brussels 2013, p. 36.