

ANALYSIS OF THE INTERFACE BETWEEN NATIONAL APPLICABLE GAUGE IN THE BULGARIAN NETWORK AND GAUGE GC, BG AND GA

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Abstract – *The report addresses the queries on the conformity assessment of the Construction gauge characteristic of the Commission Regulation (EU) № 1299/2014 from 18 November 2014 regarding the technical specifications for interoperability related to the infrastructure subsystem, which is mandatory for the application in modernization and renewal of railway sections of the main and wide-ranging railway network of the European Union. When determining the conformity, the applicable kinematic ÷ for the upper part are GA, GB and GC, and for the lower part - GI1 and GI2, as defined in standard BDS EN 15273-3. These dimensions are not addressed in the applicable national applicable documents and there are no definitions defined of their application. Documents of the Manager of the Infrastructure of the Bulgarian Railways determine the sections and the applicable dimensions, indicating the nationally applicable construction dimensions - 1-CM2, 1-CM1 and 1-CM and the European dimensions, defined in standard BDS EN 15273-1 ÷ 3. This report examines the interface between the nationally applicable construction gauges 1-CM2, 1-CM1 and 1-CM and the construction gauges defined by the kinematic gauges GA, GB and GC and on the basis of the conclusions made, the possibilities for integration of the gauge rules GA, GB and GC are determined in the national legislation.*

Keywords – *railway track, construction gauge, conformity assessment, Regulation № 1299/2014, kinematic gauge*

1. INTRODUCTION

The report examines the interface between the nationally applicable construction gauges in the Republic of Bulgaria 1-CM2, 1-CM 1 and 1-CM and the construction gauges GUC-BG, GUB and GUA, determined by kinematic calculations according to the methodology of standard EN 15273-3[1] based on kinematic dimensions GC, GB and GA. The aim of the study is to determine whether compliance with the national gauges can be considered to have achieved compliance with the European dimensions GC, GB and GA. This task is of practical importance in determining the permeability of the routes on the railway network for the main European gauges. The study may also be useful in demonstrating compliance with the requirements of characteristic item 4.2.3.1 "Construction gauge" of Regulation № 1299/2014 [2]. The application of Regulation № 1299/2014 and the technical specifications for interoperability (TSIs) in

case of modernization and renewal of railway sections on the main and wide-ranging network of the EU on the territory of the Republic of Bulgaria it is obligatory.

2. PURPOSE OF THE SCIENTIFIC RESEARCH

The Bulgarian regulations for railway define the construction gauges 1-CM 2, 1-CM1 and 1-CM, which to varying degrees provide the provision of rolling stock with static dimensions 03-BM, 02-BM, 1-BM, 0- BM and 1-T, as well as load dimensions "A", "B", "C" 1-BM and 1-T. Most of these dimensions are known as OSGD gauges, and international agreements stipulate their application on the railway corridors of the European space and the OSGD countries. In case of construction gauge 1-CM 2, the passage of static gauge 1-T is provided, which is not widely used in international circulation but defines a significantly expanded profile.

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Today, when most of the main railways are part of the EU's core and wide-ranging network, new projects demonstrate compliance with the kinematic dimensions defined according to the transport code, with GC, GB and GA gauges defined for the country. For existing routes designed and constructed in the past in accordance with national gauges, it is necessary to determine their permeability with respect to gauges GC, GB and GA.

In order to determine the compatibility with the GC kinematic gauge, the NRIC Infrastructure Manager determined the construction gauge GUC-BG. In order to determine the construction gauges based on the kinematic gauges GB and GA, kinematic determinations were performed within the first part of the project "Determination of nationally applicable rules for construction gauges and study of interface with gauges GA, GB and GC" at the University of Architecture, Civil Engineering and Geodesy. Based on the study, the construction gauges of GUB and GUA were determined, which can be used to demonstrate compliance with GB and GA gauges. This study is the second part of the research in the project, aiming to examine the interface between the nationally applicable gauges 1-CM2, 1-CM 1 and 1-CM and the construction gauges GUC-BG, GUB and GUA.

The study aims to determine whether the definition of national gauges can be added to provide some of the gauges GC, GB, GA for which modern European standards determine the need for compliance.

3. RESEARCH METHODOLOGY

In order to achieve the thus defined objectives of the study, the following methodology was chosen:

1. The profiles of gauges 1-CM 2, 1-CM1 and 1-CM are calculated for different horizontal curves from 300 m to 1500 m, with normatively determined cant, according to the methodology determined by Ordinance 58 [3].
2. The calculated profiles are displayed graphically.
3. Graphical comparison of the obtained profiles of 1-CM 2, 1-CM1 and 1-CM with extension in the curves and in straight and construction gauges GUC - BG, GUB and GUA is performed.
4. Analysis of the results and summary.

4. RESEARCH RESULTS

According to the defined methodology, several basic graphical calculations have been made for each of the national gauges.

4.1. Comparison of gauges 1-CM2 with gauges GUC-BG, GUB and GUA

Several gauges have been developed for gauge 1-CM2:

- In straight section;
- At a radius of the curve of 300 m.÷1500 m. with corresponding cant and speed.

The calculations show that the GUB and GUA profiles fit into the gauge profile 1-CM 2 in all cases under consideration.

In all cases under consideration, gauge GUC-BG does not fit in profile 1-CM2.

In the graphical analysis below are shown some of calculations of 1-CM2 gauge with gauge GUC BG/GUB/GUA.

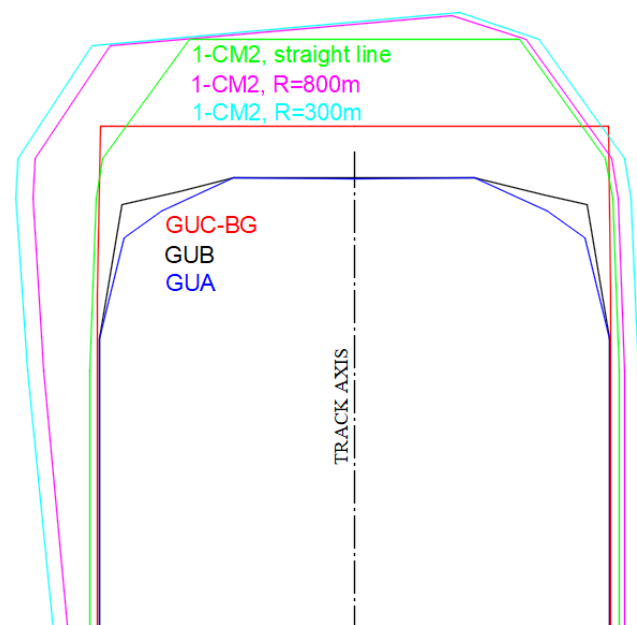


Fig.1. Graphical analysis 1-CM2 – GUC BG/GUB/GUA

4.2. Comparison of gauges 1-CM1 with gauges GUC-BG, GUB and GUA

Identical characteristic profiles have been developed for gauge 1-CM1 as for profile 1-CM2. The calculations show that the GUB and GUA profiles fit into the gauge profile 1-CM 1 in all cases under consideration. Only for profile 1-CM 1 in straight lines a significant approach to the GUB profile is established at a point with coordinates $X = 1.76 / Y = 4.31$ m in a coordinate system determined by the track axis at the level of the rail head. At this approach point, the GUB profile approaches 5 mm to the 1-CM1 profile in straight lines, but fits completely into it.

In all cases under consideration, gauge GUC-BG does not fit in profile 1-CM1.

In the graphical analysis below are shown some of calculations of 1-CM1 gauge with gauge GUC BG/GUB/GUA.

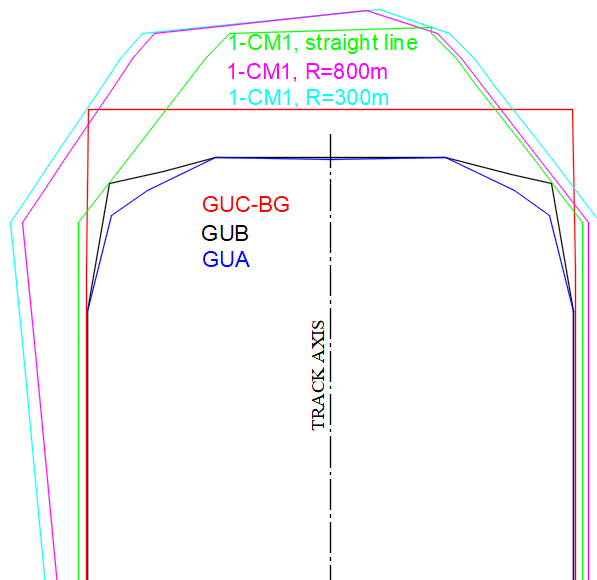


Fig.2. Graphical analysis 1-CM1 – GUC BG/GUB/GUA

4.3. Comparison of 1-CM size with GUC-BG, GUB and -GUA gauges

Identical characteristic profiles have been developed for gauge 1-CM as for profile 1-CM2. The calculations show that the GUA profiles fit into the gauge profile 1-CM in all cases.

In the case of a 1-CM profile, the output of the GUB profile is established in its highest part, but only by 2 mm. Given that the GUB profile has an additional width of 5 cm at the top, it can be tentatively assumed that the profile fits.

In all cases under consideration, the GUC-BG gauge does not fit in the 1-CM profile.

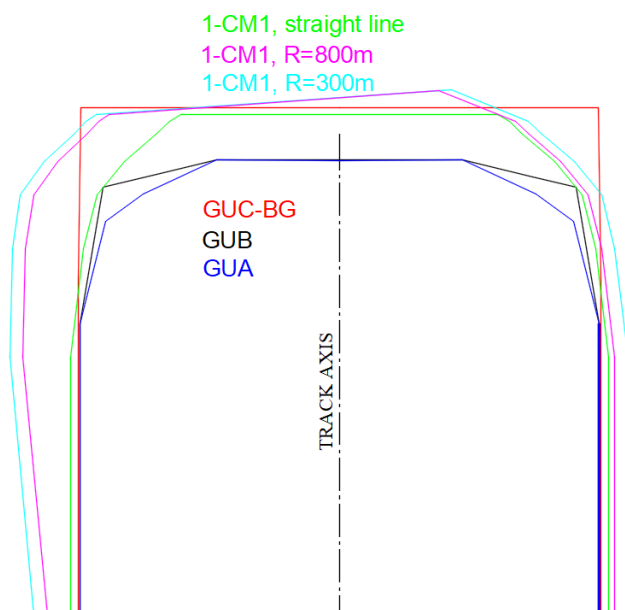


Fig.3. Graphical analysis 1-CM – GUC BG/GUB/GUA

5. CONCLUSION

Several main summaries can be made from the study:

- Rolling stock for gauges GB and GA can move in sections with construction gauge 1-CM 2;
- Rolling stock for gauges GB and GA can move in sections with construction gauge 1-CM 1;
- Rolling stock for GB and GA gauges can move in sections with construction gauge 1-CM.

- In order to ensure the GC gauge, an independent calculations must always be carried out according to the applicable methods, and this can also be done through the GUC-BG gauge. From the above statements, in the presence of existing sections for which only the national gauges are known, a conclusion can be drawn on the basis of what has been shown, and in all cases dimensional studies are required to ensure the GC dimension.

ACKNOWLEDGEMENT

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