

# POSSIBILITIES OF ROAD CARRIAGE OF FIREWORKS IN SLOVAK REPUBLIC

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*Summary: This manuscript discusses the possibilities of road carriage of pyrotechnic articles and fireworks, which are labeled as dangerous goods, which means that they are covered by the European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR). In the manuscript fireworks are identified in the first chapter, while the second chapter describes the conditions for the consignor before the transport. The third part of the article points out the possibilities of influencing such transport.*

*Key words: fireworks, pyrotechnics, explosives, carriage.*

## INTRODUCTION

By pyrotechnic articles or fireworks, is possible to imagine all products that are made for technical pyrotechnic purposes or scenic and fun use. As these products contain an explosive content, they are classified as dangerous goods by UN Orange Book, a product that due to its properties, can cause damage to health, property, carriage equipment, infrastructure or death. Scenic and amusement fireworks are seasonal goods, their carriage is growing mainly before Christmas or other major events of holidays, which does not apply to pyrotechnic articles for technical purposes. In particular, this manuscript deals with the carriage of amusement and scenic pyrotechnics and fireworks. Mainly the road carriage of fireworks is used in Slovak Republic.

## 1. IDENTIFICATION OF FIREWORKS

### 1.1 Fireworks according to UN Orange Book

According to UN Recommendation on the Transport of Dangerous Goods (UN Orange Book), fireworks should be classified in hazard classes 1.1, 1.2, 1.3 and 1.4 based on the results of Test Series 6 of the UN Manual of Tests and Criteria. Since the range of fireworks products is very wide and the availability of test facilities may be limited, classification in the relevant hazard classes may also be carried out on the basis of analogy in accordance with the procedure described in paragraphs 2.1.3.5.2 and 2.1.3.5.5. of the UN Orange Book. Assignment of fireworks to UN Nos. 0333, 0334, 0335, 0336 may be made on the basis of analogy, without the need for Test Series 6 testing in accordance with the default fireworks classification table

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in 2.2.1.1.7.5 ADR. Such assignment shall be made with the agreement of the competent authority. Items not specified in the table shall be classified on the basis of test data derived from Test Series 6. (1)

## 1.2 Fireworks according to European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR)

Since the European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR) is based on the UN Orange Book, identification and requirements for the transport of fireworks do not differ. According to ADR we recognize *FIREWORKS*: UN0333, UN0334, UN0335, UN0336, UN0337 – *Pyrotechnic articles designed for entertainment*. For technical purposes – *PYROTECHNICAL ARTICLES for technical purposes*, UN0428, UN0429, UN0430, UN0431, UN0432 and more; they also differ in their hazard class. In addition, with fireworks, we can also consider UN0454 – *LIGHTERS*, UN0455 *DETONATORS NON-ELECTRICAL for blasting*, UN0456 *DETONATORS ELECTRICAL for blasting* and more. This manuscript is primarily dedicated to UN0333, UN0334, UN0335, UN0336, UN0337 and UN0454.

Tab. 1 – Fireworks according to ADR

(1)	(2)	Class 2.2 (3a)	Classification code 2.2 (3b)	Packing group 2.1.1.3 (4)	Labels 5.2.2 (5)	Special provisions 3.3 (6)	Limited and excepted quantities		Packaging			Portable tanks and bulk containers	
							3,4 (7a)	3.5.1.2 (7b)	Packing instructions 4.1.4 (8)	Special packing provisions 4.1.4 (9a)	Mixed packing provisions 4.1.10 (9b)	Instructions 4.2.5.2 7.3.2 (10)	Special provisions 4.2.5.3 (11)
0333	FIREWORKS	1	1.1G		1	645	0	E0	P135		MP23 MP24		
0334	FIREWORKS	1	1.2G		1	645	0	E0	P135		MP23 MP24		
0335	FIREWORKS	1	1.3G		1	645	0	E0	P135		MP23 MP24		
0336	FIREWORKS	1	1.4G		1.4	645 651	0	E0	P135		MP23 MP24		
0337	FIREWORKS	1	1.4S		1.4	645	0	E0	P135		MP23 MP24		
0454	IGNITERS	1	1.4S		1.4		0	E0	P142		MP23		

ADR tank		Vehicle for tank carriage 9.1.1.2 (14)	Transport category (Tunnel restriction code) 1.1.3.6 (8.6) (15)	Special provisions for carriage				Hazard identification No. 5.3.2.3 (20)	UN No. (1)	Name and description 3.1.2 (2)
Tank code 4.3 (13)	Special provisions 4.3.5, 6.8.4 (13)			Packages 7.2.4 (16)	Bulk 7.3.3 (17)	Loading, unloading and handling 7.5.11 (18)	Operation 8.5 (19)			
			1 (B1000C)	V2 V3		CV1 CV2 CV3	S1		0333	FIREWORKS
			1 (B1000C)	V2 V3		CV1 CV2 CV3	S1		0334	FIREWORKS
			1 (C5000D)	V2 V3		CV1 CV2 CV3	S1		0335	FIREWORKS
			2 (E)	V2		CV1 CV2 CV3	S1		0336	FIREWORKS
			4 (E)			CV1 CV2 CV3	S1		0337	FIREWORKS
			4 (E)			CV1 CV2 CV3	S1		0454	IGNITERS

Source: (2)

The divisions 1.1 to 1.6 of Class 1 Explosives are defined in 2.2.1.1.5 of ADR. The compatibility groups of substances and articles are described in 2.2.1.1.6 of ADR.

### **1.3 Fireworks according to Regulation of the government of the Slovak Republic No. 70/2015 Coll. about the availability of pyrotechnic articles on the market**

Regulation of the Government of the Slovak Republic No. 70/2015 Coll. about the availability of pyrotechnic articles on the market adjusts the technical requirements for the pyrotechnic article, the conformity assessment procedure for pyrotechnic articles, the rights and obligations of the manufacturer, importer and distributor. It also describes the authorization and notification of the conformity assessment body, the rights and obligations of the notified body and the age limits for making products available on the market.

§4 categorizes pyrotechnic articles to:

a) Amusement fireworks:

1. Category F1
2. Category F2
3. Category F3
4. Category F4

b) Scenic fireworks:

1. Category T1
2. Category T2

c) Other pyrotechnic articles:

1. Category P1
2. Category P2

These categories differ in their hazard levels, noise levels, use restrictions and define the persons and their age that the products can use. (3)

## **2. PROCEDURES FOR SENDING THE FIREWORKS**

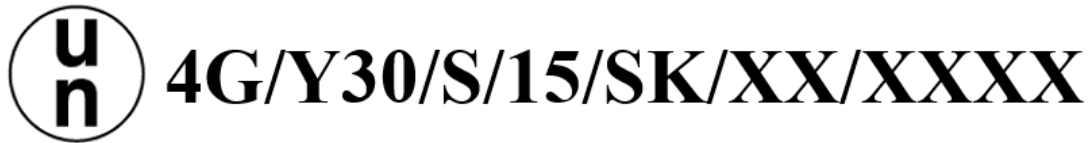
### **2.1 Documents and packaging**

Every firework manufactured and imported shall have its EC certificate in accordance with Directive 2007/23/EC, where its name, registration number, and classification (e.g. F2, rocket) is clearly defined. This certificate entitles the manufacturer or importer to sell the product within the EU.

In addition, an ADR Certificate of Class 1 Classification – Explosives shall be assigned to each product. This certificate is issued by a certified notified body who has conducted fireworks tests. The fireworks article is hereby granted a registration number which shall be mentioned in the transport documents according to 5.4.1.2.1 ADR. According to this certificate, the article is classified under a certain UN number and its division and compatibility group.

The fireworks shall be properly packed according to ADR in packaging that meets the requirements of the provisions of ADR. Each packaging for dangerous goods shall have a UN Code of Approval where packaging requirements, packaging properties, labeling, the person

who tested the packaging and the validity of the permit are listed. 2.2.1.1.7.4 the classification shown in the table in 2.2.1.1.7.5 applies only for articles packed in fibreboard boxes (4G).



Source: Author

Fig. 1 – UN Code of packaging for fireworks

Where:

- UN – The United Nations packaging symbol
- Y30 – Y fo packing groups II and III, max. 30kg gross weight
- S – the packaging is intended for the carriage of solids or inner packagings
- 15 – year of manufacture
- SK – state of manufacture
- XX/XXXX – The name of the manufacturer or other identification of the packaging specified by the competent authority

## 2.2 Carriage of fireworks

Since the carriage of fireworks in Limited Quantities (LQ) and Excepted Quantities (EQ) is forbidden, the only way of fireworks carriage is standard carriage or the carriage of exemptions according to 1.1.3.6 of ADR.

### 2.2.1 Carriage modes

The carriage of exemptions related to quantities carried per transport unit is limited by the transport category, which is as follow for each UN number:

- UN0333, UN0334, UN0335 – transport cat. 1 – max. 20kg per transport unit;
- UN0336 – transport cat. 2 – max. 333kg per transport unit;
- UN0337, UN0454 – transport cat. 4 – unlimited amount per transport unit.

For class 1-explosives, “maximum total quantity per transport unit” means Net Explosive Content (NEC or NEQ), which is the sum of all explosive contents in each article. For example:

- Rockets, 2500 pcs, Gross weight 150g/pcs, NEC 64g/pcs;
- **Total Gross weight 375kg, NEC 160kg.**

Which means that while the gross weight is more than 333kg per transport unit, but the NEC is 160kg, so it can be transport as an exemption related to quantities carried per transport unit.

While carrying in a mode where NEC is more than the limiting quantity, all provisions of ADR (equipment, training, vehicles, etc.), as well as the limits for each Class as specified in 7.5.5.2 ADR shall be taken into account:

Transport Unit	Division	1.1 UN0333		1.2	1.3	1.4 UN0337 UN 0454	1.5 and 1.6	Empty uncleaned packagings	
	Compatibility group	1.1A	Other than 1.1A			Other than 1.4S	1.4S		
EX/II <sup>a</sup>		6.25	1 000	3 000	5 000	15 000	Unlimited	5 000	Unlimited
EX/III <sup>a</sup>		18.75	16 000	16 000	16 000	16 000	Unlimited	16 000	Unlimited

Source: Author according to (2)

Fig. 2 – Limits for fireworks transport in standard transport mode

6	7	8	9	10	11	12
Signo a číslo Zeichen und Nr.	Počet balení Anzahl der Kolli	Druh obalu Art der Verpackung	Označení tovaru <sup>a</sup> Bezeichnung des Gutes	Statistické čís. Statistische Nr.	Hr. hmotnosť v kg Bruttogewicht kg	Objem m <sup>3</sup> Umfang m <sup>3</sup>
<b>ADR 1.1.3.6 – Dopravná kategória 2 – Transport category 2</b>						
UN0336 OHŇOSTROJNÉ TELESÁ, 1.4G, (E)					gr. 375 kg	
UN0336 FIREWORKS, 1.4G, (E)					NEC 160 kg	
50 x Fibreboard boxes 4G						

Source: Author according to (2)

Fig. 3 – Transport document of fireworks in exemptions 1.1.3.6 ADR in Slovak and English language

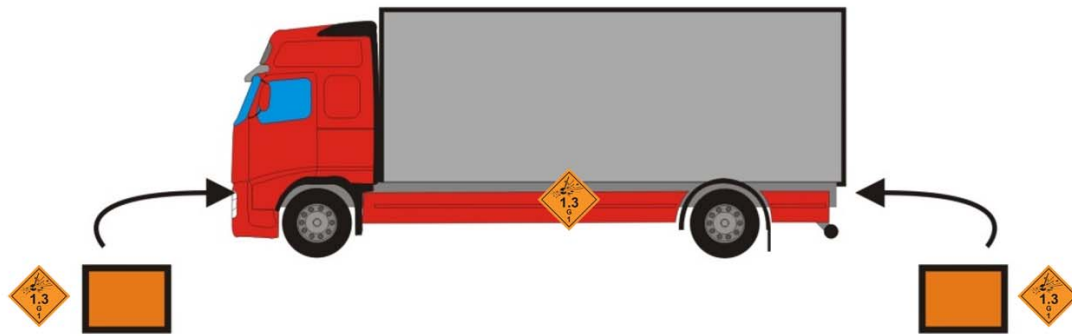
The transport of fireworks is only allowed by approved transport units marked as EX/II and EX/III with valid Certificate of Approval for Vehicles carrying certain Dangerous Goods.

### 2.2.2 Placarding of vehicles

Chapter 5.3.1.1.2 ADR says:

- For Class 1, compatibility groups shall not be indicated on placards if the vehicle, container or special compartments of MEMUs are carrying substances or articles belonging to two or more compatibility groups. Vehicles, containers or special compartments of MEMUs carrying substances or articles of different divisions shall bear only placards conforming to the model of the most dangerous division in the order:
- **1.1 (most dangerous), 1.5, 1.2, 1.3, 1.6, 1.4 (least dangerous).**

For the consignor and the haulier, this means that if the vehicle is loaded with, for example, UN0335 (1.3G), UN0336 (1.4G) and UN0337 (1.4S), the vehicle will need to be labeled with the 1.3 safety label (according to 5.3.1.1.2 ADR) as shown in Fig. 4.



Source: Author

Fig. 4 – Vehicle carrying fireworks of different division of Class 1 Explosives

### 3. POSSIBILITIES OF THE AFFECT OF FIREWORKS TRANSPORT

The consignor is limited by regulations, laws and by the ADR agreement, but there are still many ways in which the consignor can affect the transportation of fireworks.

- **Use of the exemption transport according to 1.1.3.6 ADR** – the sender can plan routes and deliveries to use exemption transport 1.1.3.6 ADR as much as possible.
- **Production of fireworks with lower NEC** – the consignor, if it is also a manufacturer, may consider producing fireworks to contain a smaller amount of NEC, which may result in a less stringent classification (e.g., from 1.3G to 1.4G), which affects the above-mentioned exemption transport according to 1.1.3.6.
- **Combining and consolidating shipments** – the shipper may consolidate the shipments (especially exemption transport), in order to use the space, while complying with the provisions of 1.1.3.6 of the ADR. This allows to carry multiple class transport, for example, UN0336, UN0337 and UN0454 together.
- **Packaging redesign** – the consignor / manufacturer can make packaging adjustments (thickening walls, separators, fillers, additional plastic or steel coverage, etc.) and then ask to repeat the tests, which could result in lower class reclassification (e.g. 1.3G to 1.4G, 1.4G to 1.4S). The number of firework articles in one outer package can also be reduced. This could affect the price of the packaging, but also can reduce the price of a carriage.

### CONCLUSION

This manuscript pointed out the complexity of the transport of fireworks in the Slovak Republic. Although the transportation of fireworks is rather seasonal and less frequent, its volume has increased in recent years. The shipper (or manufacturer and carrier) shall comply with a series of regulations, laws, restrictions and agreements in such shipments, but there are nevertheless several ways in which such shipments may be affected. The aim of this article was to outline some ways to influence the transportation of firework.

## REFERENCES

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- (3) Nariadenie vlády Slovenskej republiky č. 70/2015 Z.z. o sprístupňovaní pyrotechnických výrobkov na trhu.