INF. 32

Economic Commission for Europe **17 January 2013**

Inland Transport Committee

Working Party on the Transport of Dangerous Goods

Joint Meeting of Experts on the Regulations annexed to the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) (ADN Safety Committee)

Twenty-second session
Geneva, 21 – 25 January 2013
Item 5 (b) of the provisional agenda
Proposals for amendments to the Regulations annexed to ADN: Other proposals

Explosion groups for electrical and non-electrical equipment

Explosion groups IIB3 and sub-groups

Transmitted by the Recommended ADN Classification Societies

Application of explosion group requirements are, for the time being, not explicit for non- electrical equipment (mechanical equipment , including also flame arrester).
Flame arrester manufacturers use subdivision in the group IIB.
The Informal Group looks for a clarification about :

1. *application of explosion group requirements for non- electrical equipment*
2. *application of sub-division for group IIB*

1. According to 1.2.1. Definitions , an *'Explosion group' means a grouping*
- of flammable gases and vapours according to their maximum experimental safe gaps and minimum ignition currents,
- and of electrical apparatus which may be used in the corresponding potentially explosive atmosphere
(see IEC publication 79 and EN 50014: 1994).

2. There are 3 explosion groups IIA, IIB and IIC. used in ADN (see 3.2.3.3 – Column(16)) .

Explosion group	Maximum experimental safe gap in mm
II A	> 0.9
II B	≥ 0.5 to ≤ 0.9
II C	< 0.5

I. Application of explosion group requirements for non-electrical equipment:

3. Actually the requirements linked with the explosion group is limited to the electrical equipment :
a)

9.3.1.51.3 - For the selection of electrical equipment to be used in zones presenting an explosion risk, the explosion groups and temperature classes assigned to the substances carried in the list of substances shall be taken into consideration (See columns (15) and (16) of Table C of

Chapter 3.2).

9.3.2.51.3 - For the selection of electrical equipment to be used in zones presenting an explosion risk, the explosion groups and temperature classes assigned to the substances carried in accordance with columns (15) and (16) of Table C of Chapter 3.2 shall be taken into consideration.

9.3.3.51.3 - For the selection of electrical equipment to be used in zones presenting an explosion risk, the explosion groups and temperature classes assigned to the substances carried in columns (15) and (16) of Table C of Chapter 3.2 shall be taken into consideration.

b)

8.6.1.3 Model for a certificate of approval for tank vessels

9. Electrical equipment:
- *Temperature class: ……..*
- *Explosion group: ……..*

8.6.1.4 Model for a provisional certificate of approval for tank vessels

9. Electrical equipment:
- *Temperature class: ……*
- *Explosion group: ……...*

c)

3.2.4.3

(I) Column (17): Determination of whether anti-explosion protection is required for electrical equipment and systems

4. "The Safety Committee was of the opinion that the requirements for explosion groups applied to all equipment, and not just electrical installations." (see item 45 of the report ECE/TRANS/WP.15/AC.2/44 - 21th Session (Aug 2012)) .

5.First , it would be use full to define which equipments are concerned .
According to EN 13463-1:2009 ,

a) a "**non-electrical equipment"** is an **"**equipment which can achieve its intended function mechanically " (see § 3.12) ;
b) "**equipment"** means **"**machines, apparatus, fixed or mobile devices, control components and instrumentation thereof and detection or prevention systems which, separately or jointly are intended for the generation, transfer, storage,measurement, control and conversion of energy and/or the processing of material and which are capable of causing an explosion through their own potential sources of ignition " (see § 3.1) .

6. Secondly , the non-electrical equipment for use in potentially explosive atmospheres would be according to the standard EN 13463-1:2009 ("Non-electrical equipment for use in potentially explosive atmospheres") .

EN 13463-2, *Protection by flow restricting enclosure 'fr'.*
EN 13463-3, *Protection by flameproof enclosure 'd'.*
EN 13463-5, *Protection by constructional safety 'c'.*
EN 13463-6, *Protection by control of ignition source 'b'.*
EN 13463-8, *Protection by liquid immersion 'k'.*

7. A amendment would be foreseen :

a) what has to be required for non-electrical equipment for what concerns the "explosion group"

b) the Model of certificate would indicate the “explosion group for non-electrical equipment” in addition to the item 9 (Electrical equipment – Explosion group) of the Certificate .

II . Application of sub-division for group IIB for equipment incorporating flame arresters:

8. For equipment incorporating flame arresters the classification of the explosion groups is extended as shown in EN 13463-1:2009 (item 4.2-Table 2- Explosion groups for equipment incorporating flame arresters (subdivisions)) . (see also EN 12874 :2001 – item 5.8.2. ; the EN ISO 16852:2010 will substitute the EN 12874:2001 using the same title) :

Explosion group	**Maximum experimental safe gap (MESG) of gas/air-mixture**
IIA1	≥ 1,14
IIA	> 0,90
IIB1	≥ 0,85
IIB2	≥ 0,75
IIB3	≥ 0,65
IIB	≥ 0,50
IIC	< 0,50

9. Taking into account that an IIB3 flame arrester can be used for about 96 % of all substances and that approximately 3% of all flammable substances are in explosion group IIB(0.65-0.50mm) , on board of the tankers it is often used flame arresters with an explosion group ‘IIB3’ : this means a minimum MESG of 0.65 and not 0.50 mm .

Note : (see EN 60079-20-1 / Annexe B)
The following ADN dangerous goods would need a MESG of 0.50 mm :
UN 1038 – ETHYLENE, REFRIGERATED LIQUID ; CAS 75-21-8 ; MESG 0.59
UN 1040 – 1.2-epoxyethan ; CAS 75-21-8 ; MESG 0.59
UN 1167 – divinylether
UN 1986 – CAS 107-19-7 ; MESG 0.58
UN 2615 – ethylpropylether
UN 2209 – formaldehyde ; CAS 50-00-0 ; MESG 0.57
UN 1993 – propenylethylether
For those substances , a IIB3 flame arrester would be not sufficient .

10. It would be better to indicate all the ADN dangerous substances which require a IIB (0.65 mm > MESG >= 0.50 mm) .
This indication could be a footnote attached to the Column 16 like : “where a group of explosion IIB is required , a IIB3 is sufficient for flame arrester except for the following substances for which a IIB (MESG 0.50 mm) is required : <list to be determined> “ .
The Model of certificate would also include the group of explosion for the flame arrester .