

Economic Commission for Europe

Inland Transport Committee

Working Party on the Transport of Dangerous Goods

English

23 January 2017

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)

Thirtieth session

Geneva, 23–27 January 2017

Item 5 (b) of the provisional agenda

**Proposals for amendments to the Regulations annexed to ADN:
other proposals**

Autonomous protective systems

Transmitted by EBU, ESO and ERSTU

Initial situation

Numerous documents were submitted for the twenty-ninth session of the safety committee concerning the requirements governing explosion-potential groups for non-electrical equipment.

Because it was not possible for reasons of time to amend the ADN 2017, the safety committee agreed during the initial phase to settle problems by means of multilateral agreements.

The inland navigation industry is grateful for this. However, multilateral agreement ADN / M 018 imminently requires measures necessitating careful preparation in respect of those ships whose certificate of approval need to be renewed after 31st December 2018.

Consequently it is necessary to address a number of the questions raised by the shipping industry in a timely manner.

Question

The minutes of the twenty-ninth session of the safety committee ADN/WP.15/AC.2/60 noted under section 44 that the informal “substances” working group has now been requested to look into various facts.

What progress have these investigations made?

Enquiry concerning the minutes of the twenty-ninth session

The minutes of the twenty-ninth session of the safety committee ADN/WP.15/AC.2/60 noted under section 44 – second sub-point – that the industry is required to provide the substances working group with relevant information. This wording in the minutes requires clarification.

Without doubt the inland navigation industry has the greatest interest in a systematic review and, if applicable, provision of the entries in column 16 of table C of the ADN.

The inland navigation industry never acquires title to the cargo. The inland navigation industry does not therefore see itself as being in a position to commission the experimental determination of explosion-potential groups or subgroups based on cargo samples.

Moreover, in the case of N.O.S entries, the inland navigation industry typically does not possess the necessary information that would allow the required explosion-potential groups or subgroups to be determined.

The shipping industry as well is affected by findings in respect of explosion-potential groups or subgroups. The shipping industry is far better informed about the characteristics of the goods to be shipped than the inland navigation industry.

The inland navigation associations therefore ask the safety committee to clarify exactly how it sees the information in question being provided “by the industry”.

Determination of the explosion-potential group or subgroups

The inland navigation industry provided the twenty-ninth session of the safety committee with an indication of a theoretical approach to determining explosion-potential groups or subgroups in document INF. 21. A calculation for UN 1170 ethanol was submitted by way of an example.

Given the complexity of the substance, the inland navigation industry appreciates that this aspect cannot be addressed in detail at the twenty-ninth session.

The inland navigation industry is now proposing to undertake a systematic review of explosion-potential groups or subgroups in accordance with the theoretical approach in standards EN-IEC 60079-20-1 and ISO/IEC DIS 80079-20-1.

Following the shipping industry’s investigations it should be emphasised that the N.O.S. items in UN 1268 and 3295, of which many millions of tonnes of cargo are transported, are to be prioritised for investigation and probably reclassified as explosion-potential group IIA.

As a prelude to this discussion, the inland navigation industry has already conducted extensive comparative calculations that frequently reveal that a “lighter” explosion-potential group or subgroups is sufficient instead of explosion-potential group IIIB.

These results are summarised in the accompanying table.

Owing to the importance of this matter, the inland navigation industry has already signalled that additional industry experts would like to participate in the informal “substances” working group’s future deliberations.

MESG
 Group IIA: MESG ≥ 0,9 mm.
 Group IIB: 0,5 mm < MESG < 0,9 mm.
 Group IIC: MESG ≤ 0,5 mm.
 MIC
 Group IIA: MIC > 0,8.
 Group IIB: 0,45 ≤ MIC ≤ 0,8.
 Group IIC: MIC < 0,45.
 SUBGROUP IIB
 Group IIB: MESG > 0,5 mm.
 Group IIB3: MESG ≥ 0,85 mm.
 Group IIB2: MESG ≥ 0,75 mm.
 Group IIB1: MESG ≥ 0,65 mm.
 Group IIA: MESG ≥ 0,9 mm.

FORMULA for MIXTURES

MESG $\sum_i (X_i/MESG_i)$

Norm ISO-EIC-DIS 80079-20-1

UN	Naam	MESG	MIC	method.
1098	ACETAL	0,91		d
1099	ACETALDEHYDE (ETHANAL)	0,92	0,98	a
1000	ACETONE	1,01	1	c
1092	ACROLEINE	0,72		
1093	ACRYLONITRILE	0,87	0,78	c
1098	ALLYL ALCOHOL	0,84		a
1100	ALLYL CHLORIDE	1,17	1,33	a
1105	PENTANOLS (n-PENTANOL)	0,99		a
1106	AMYLAMINE (n-AMYLAMINE)			
1107	AMYLCHLORIDES			
1108	1-PENTENE (n-AMYLENE)	0,98		a
1114	BENZENE	0,99		a
1120	BUTANOLS (n-BUTYL ALCOHOL)	0,91		a
1120	BUTANOLS (sec.- BUTYLALCOHOL)			d says IIA,
1120	BUTANOLS (tert.- BUTYLALCOHOL)			
1123	BUTYLACETATES (n-BUTYL ACETATE)	1,04	1,08	c
1123	BUTYLACETATES (sec-BUTYL ACETATE)			
1125	n-BUTYLAMINE	0,92	1,13	c
1127	CHLOROBUTANES (1-CHLORO BUTANE)	1,06		a
1127	CHLOROBUTANES (2-CHLORO BUTANE)	1,10		a
1127	CHLOROBUTANES (1-CHLORO-2-METHYLPROPANE)	1,25		a
1127	CHLOROBUTANES (2-CHLORO-2-METHYLPROPANE)	1,40		a
1128	BUTYRALDEHYDE	0,92		a
	1133 CARBON DISULFIDE	0,34	0,39	c
1134	CHLOROBENZENE (phenylchloride)			d says IIA
1135	ETHYLENE CHLOROXYDRIN (2-chloroethanol)			d says IIA
1143	CROTONALDEHYDE	0,81		a
1145	CYCLOHEXANE	0,94		a
1146	CYCLOPENTANE	1,01		d
1150	(trans) 1,2-DICHLOROETHYLENE	3,91		a
1150	(cis) 1,2-DICHLOROETHYLENE	3,91		a
1153	ETHYLENE GLYCOL DIETHYLETER			
1154	DIETHYLAMINE	1,15		a
1155	DIETHYL ETHER	0,87	0,88	a
1157	DIISOBUTYL KETONE			
1159	DIISOPROPYL ETHER	0,94		a
1160	DIMETHYLAMINE AQUEOUS SOLUTION	1,15		a
1163	DIMETHYLHYDRAZINE	0,85		a
1165	DIOXANE	0,70	0,19	a
1167	DIVINYL ETHER	0,88		d
1170	ETHANOL (ETHYLALCOHOL) > 70% ALCOHOL	0,89	0,88	c
1170	ETHANOL (ETHYLALCOHOL) 24 < ALCOHOL% , 70	>0,9		
1171	ETHYLENE GLYCOL MONOETHYL ETHER	0,78		a
1172	ETHYLENE GLYCOL MONOETHYL ETHER-ACETATE	0,97		a
1173	ETHYL ACETATE	0,99		a
1175	ETHYL BENZENE			d
1177	2-ETHYLBUTYL ACETATE			d
1179	2-ETHYLBUTYLETER (ETHYL-tert-BUTYLETER)			
1184	ETHYLENE DICHLORIDE (1,2-dichloorethane)	1,80		a
1188	ETHYLENE GLYCOL MONOMETHYL ETHER	0,85		a
1191	OCTYL ALDEHYDES (2-ethylcapronaldehyde)			
1191	OCTYL ALDEHYDES (n-OCTALDEHYDE)			
1193	ETHYLMETHYLKETONE or METHYLETHYLKETONE	0,84	0,92	b
	1198 FORMALDEHYDE SOLUTION	0,57		
1199	FURALDEHYDES (a-FURALDEHYDE) or FURFURALDEHYDES (a-FURFURALDEHYDE)	0,88		a
1203	MOTORSPIRIT or GASOLINE or PETROL			
1206	HEPTANES	0,91	0,88	c
1208	HEXANES	0,93	0,88	c
1212	ISOBUTANOL or ISOBUTYLALCOHOL	0,88		a
1213	ISOBUTYLACETATE	1,04		a
1214	ISOBUTYLAMINE	1,12		a
1216	ISOCTENES	0,95		a
1218	ISOPRENE	0,79		
1219	ISOPROPYLALCOHOL of ISOPROPANOL	1,00		a

Methode according to ISO-EIC-DIS 80079-20-1
 a = classified according to MESG determination.
 b = classified according to MIC ratio.
 c = both MESG and MIC ratio have been determined.
 d = classified according to similarity of chemical structure (provisional classification).
 Classificatie van gas mengsels

 According to the formula in ISO-EIC-DIS 80079-20-1 for mixtures and the mixture doesn't contain components for what IIB or IIC is described or the mixture contains less 30% of these components, IIB3 complies

ADN 2015	according to this norm	
IB1	IB2	Similar to 1,2 Diethoxyethane
IA	IA	
IA	IA	
IB	IB3	(ADN WP.15/AC.2/2016/4 says IIB3)
IB	IB1	(ADN WP.15/AC.2/2016/4 says IIB2)
IB	IB2	(ADN WP.15/AC.2/2016/4 says IIB3)
IA	IA	
IA	IA	
IA	IA	all amines products MESG IIA, all AMYL CHLORIDES MESG IIA, according to AMYLENE IIA
IA	IA	
IB	IA	(ADN WP.15/AC.2/2016/4 says IIB2)
IB	IA	(ADN WP.15/AC.2/2016/4 says IIB2)
IA	IA	(ADN WP.15/AC.2/2016/4 says IIB2)
IA	IA	
IA	IA	
IA	IA	
IA	IA	
IA	IA	
IA	IA	
IA	IA	
IA	IA	
IC	IC	
IA	IA	
IA	IA	
IB	IB2	(ADN WP.15/AC.2/2016/4 says IIB2)
IA	IA	
IA	IA	
IB	IB1	ADN WP.15/AC.2/2016/4 says IB1
IA	IA	all xxxYL KETONES products MESG IIA,
IA	IA	
IB	IB2	(ADN WP.15/AC.2/2016/4 says IIB2)
IA	IA	
IB	IB1	Similar to 1,1-Dimethylhydrazine ?
IB	IB3	Similar to 1,4-Dioxane and ADN WP.15/AC.2/2016/4 says IIB3
IB	IB3	similar to Divinylene oxide)
IB	IB1	ADN WP.15/AC.2/2016/4 says IB1
IB	IA	according Norm ISO-EIC-DIS 80079-20-1 ≥ 4 vol-% water IIA
		ADN WP.15/AC.2/2016/4 says IB1
		ADN WP.15/AC.2/2016/4 says IIB2
IA	IA	
IA	IA	
IA	IA	
IA	IA	
IA	IA	Similar to UN 2398 MTBE ?
IA	IA	
IA	IB1	
IA	IA	
IA	IA	n-octaldehyde classified by MIC
IB	IB	
IA	IB1	ADN WP.15/AC.2/2016/4 says IB1
IA	IA	petrol or gasoline isnt classified in this norm
IA	IA	
IA	IA	
IA	IA	
IA	IA	similar to n-butylacetate
IA	IA	similar to DiISOBUTYLAMINE
IA	IA	similar to n-octene
IA	IB2	similar to 1,3-butadiene and ADN WP.15/AC.2/2016/4 says IIB2
IA	IA	

MESG

Group IA: MESG ≥ 0,9 mm.
Group IB: 0,5 mm < MESG < 0,9 mm.
Group IC: MESG ≤ 0,5 mm.

MIC

Group IA: MIC > 0,8.
Group IB: 0,45 ≤ MIC ≤ 0,8.
Group IC: MIC < 0,45.

SUBGROUP IIB

Group IIB: MESG > 0,5 mm.
Group IIB3: MESG ≥ 0,65 mm.
Group IIB2: MESG ≥ 0,75 mm.
Group IIB1: MESG ≥ 0,85 mm.
Group IA: MESG ≥ 0,9 mm.

UN Naam

1220	ISOPROPYLE ACETATE
1221	ISOPROPYLAMINE
1223	KEROSINE
1224	KETONES N.O.S
1229	MESITYL OXYDE
1230	METHANOL
1231	METHYL ACETATE
1235	METHYLAMINE, AQUEOUS solution
1243	METHYL FORMATE
1244	METHYL HYDRAZINE
1245	METHYL ISOBUTYL KETONE
1247	METHYLMETHACRYLATE
1262	OCTANES
1264	PARALDEHYDE
1265	n-PENTANES
1265	PENTANES (2-METHYLBUTANE)
1267	PETROLEUM CRUDE OIL with more than 10% BENZENE
1267	PETROLEUM CRUDE OIL
1268	PETROLEUMDESTILLATES NOS. (NAPHTA)
1268	PETROLEUMDESTILLATES NOS
1268	PETROLEUMDESTILLATES NOS. with more than 10% BENZENE
1268	PETROLEUMDESTILLATES NOS. (BENZENE HEARTCUT)
1274	PROPYLALCOHOL
1275	PROPIONALDEHYDE
1276	n-PROPYLACETATE
1277	PROPYLAMINE (1-AMINOPROPANE)
1278	1-CHLOROPROPANE (propylchloride)
1279	1,2-DICHLOROPROPANE (PROPYLENE DICHLORIDE)
1280	PROPYLENE OXIDE
1282	PYRIDINE
1289	SODIUM METHYLATE SOLUTION in alcohol
1294	TOUENE
1296	TRIETHYLAMINE
1300	TURPENTINE SUBSTITUTE
1301	VINYLACETATE
1307	XYLENES (m-XYLENE) XYLENNE (o-XYLENE)
1545	ALLYL ISOTHO CYANATE
1573	CHLORONITROBENZENES (P-CHLORONITROBENZE)
1604	ETHYLENEDIAMINE
1645	ACETONITRIL (methylcyanide)
1662	NITROBENZENE
1663	NITROPHENOLS
1715	ACETIC ANHYDRIDE
1717	ACETYL CHLORIDE
1738	BENZYL CHLORIDE
1750	CHLOROACETIC ACID SOLUTION
1764	DICHLOROACETIC ACID
1779	FORMIC ACID WITH MORE THAN 85% acid by mass
1783	HEXAMETHYLENEDIAMINE solution
1863	FUEL, AVIATION, TURBINE ENGINE
1863	FUEL, AVIATION, TURBINE ENGINE (with more than 10% BENZENE)
1915	CYCLOHEXANONE
1917	ETHYLACRYLATE
1918	ISOPROPYLBENZEEN (cumeen)
1919	METHYLACRYLATE
1920	NONANES
1922	PIPERIDINE
1988	ALCOHOLS, FLAMABLE, TOXIC, NOS
1987	ALCOHOLS NOS
1987	ALCOHOLS, NOS (cyclohexanol)
1987	ALCOHOLS, NOS (90 mas-% tert.-BUTANOL en 10 mas-% METHANOL)
1989	ALDEHYDES NOS
1991	CHLOROPRENE
1992	FLAMABLE LIQUID TOXIC, NOS

FORMULA for MIXTURES

MESG1/

$$\sum_i(X_i/MESG_i)$$

Norm ISO-EIC-DIS 80079-20-1

MESG MIC method.

ADN 2015

according to this norm

1,05	a	IA1	IA	
1,02	a	IA1	IA	similar to DIISOPROPYLAMINE
	d	IA1	IA	similar to Diesel Oil No. 1
0,84	0,92	IB1	IA	Similar to 2-Butanone (= Ethyl methyl ketone) with the smallest MESG but MIC = 0,92, other ketones all MESG > 0,9
0,93	a	IB1	IA	
0,92	0,82	IA	IA	
0,97	1,08	IA	IA	
1,10	a	IA	IA	
0,94	a	IA	IA	
		IC1	IB1?	Similar to dimethyl hydrazine with a MESG = 0,85
1,01	a	IA	IA	
0,85	a	IA	IA	
0,94	a	IA	IA	
1,01	a	IA1	IA	
0,93	0,97	IA	IA	
0,88	a	IA	IA	
		IB1	IB3	###
		IB1	IB3	###
		IA	IA	###
		IB1	IB3	###
		IA	IA	###
0,89	a	IB	IB1	
0,86	a	IB	IB3	Propionic aldehyde
1,04	a	IA	IA	
1,13	a	IA	IA	
	a	IA	IA	
	d	IA1	IA	
0,70	d	IB	IB3	
	d	IA1	IA	
1,08	a	IA	IA	
	d	IA1	IA	
	d	IB1	IA	similar to turpentine oil?
0,94	a	IA	IA	
1,09	a	IA	IA	
		IB1	IB2	according to METHANENITRIL MESG = 0,8 as nitril with the smallest MESG
1,18	a	IB1	IA	NITOBENZENE MESG = 0,94 and chloro connections MESG > 0,9
1,50	a	IA	IA	
0,94	a	IB	IA	(ADN WP: 15/AC.2/2016/4 says IB1)
		IB1	IA	according to NITROBENZENE (MESG = 0,94) (phenol= HYDROXYBENZENE AND BENZENE-connections ≥ IA)
1,23	a	IA	IA	
	d	IA1	IA	
	d	IA1	IA	
		IA	IA	all acetic connections MESG > 0,9
1,86	a	IA	IA	all acetic connections MESG > 0,9
		IB1	IA	according to similar diamineconnections and cyclohexane (hexamethylene) MESG = > 0,9
	d	IB1	IA	similar to Kerosine
	d	IB1	IA	similar to Kerosine and benzene connections MESG > 0,9
0,85	a	IA	IA	
0,88	a	IB	IB1	ADN WP: 15/AC.2/2016/4 says IB1
1,05	d	IA1	IA	
		IB	IA	according to MIC classification IA
0,85	0,98	IB	IA	(ADN WP: 15/AC.2/2016/4 says IB1)
	d	IA	IA	
		IA1	IA	cyclic amine connection MESG > 0,9
		IB1	IB1	similar to methanol mixtures
		IB1	IB1	similar to xxx-anol group not toxic
	d	IA	IA	
		IA	IA	
		IB1	IB2	IF non formaldehyde or connections of formaldehyde present in the mixture, else UN 1198
		IB1	IB2	similar to 1,3 butadien
		IB1	IB3	###

Methode according to ISO-EIC-DIS 80079-20-1

a = classified according to MESG determination.

b = classified according to MIC ratio.

c = both MESG and MIC ratio have been determined.

d = classified according to similarity of chemical structure (provisional classification).

Classificatie van gas mengsels

According to the formula in ISO-EIC-DIS 80079-20-1 for mixtures and the mixture doesn't contain components for what IB or IC is described or the mixture contains less 30% of these components, IB3 applies

MESH		FORMULA for MIXTURES			Methode according to ISO-EIC-DIS 80079-20-1	
Group IIA: MESH \geq 0,9 mm.		MESH \leq 0,5 mm $\Sigma(X_i/MESH_i)$			a = classified according to MESH determination.	
Group IIB: 0,5 mm < MESH < 0,9 mm.					b = classified according to MIC ratio.	
Group IIC: MESH \leq 0,5 mm.					c = both MESH and MIC ratio have been determined.	
MIC					d = classified according to similarity of chemical structure (provisional classification).	
Group IIA: MIC > 0,8.					Classificatie van gas mengsels	
Group IIB: 0,45 \leq MIC \leq 0,8.						
Group IIC: MIC < 0,45.						
SUBGROUP IIB		Norm ISO-EIC-DIS 80079-20-1			### According to the formula in ISO-EIC-DIS 80079-20-1 for mixtures and the mixture doesn't contain components for what IIB or IIC is described or the mixture contains less 30% of these components, IIB3 complies	
Group IIB: MESH > 0,5 mm.		MESH MIC method.				
Group IIB3: MESH \geq 0,65 mm.						
Group IIB2: MESH \geq 0,75 mm.						
Group IIB1: MESH \geq 0,85 mm.						
Group IIA: MESH \geq 0,9 mm.						
LIN	Naam	MESH	MIC	method.	ADN 2015	according to this norm
1993	FLAMABLE LIQUID, NOS (CYCLOHEXANONE / CYCLOHEXANOL MIXTURE)				IIA	IIA
1993	FLAMABLE LIQUID, NOS (with more than 10% BENZENE)				IIB ⁴	IIB3 ###
1993	FLAMABLE LIQUID, NOS				IIB ⁴	IIB3 ###
1999	TARS, LIQUID, including road oils and cutback bitumens				IIA ⁷	IIA
2021	CHLOROPHENOLS, LIQUID (2-CHLOROPHENOL)				IIA ⁷	IIA
2022	CRESILIC ACID				IIA ⁷	IIA
2023	EPICHLOROHYDRINE	0,74		a	IIB	IIB3
2045	ISOBUTYRALDEHYDE (ISOBUTYL ALDEHYDE)				IIA ⁷	IIA
2046	CYMENES	---		d	IIA ⁷	IIA
2047	1,3-DICHLOROPROPENE				IIA ⁷	IIA
2047	2,3-DICHLOROPROP-1-ENE				IIA ⁷	IIA
2047	MIXTURE of 2,3-DICHLOROPROP-1-ENE and 1,3-DICHLOROPROPENE)				IIA ⁷	IIA
2048	DICYCLOPENTADIENE	0,91		a	IIA	IIA
2050	DIISOBUTYLENE				IIA ⁷	IIA
2051	2-DIMETHYLAMINO ETHANOL				IIA ⁷	IIA
2053	METHYLSOBUTYL CARBINOL (methylalcohol)	1,01		a	IIB ⁴	IIA
2054	MORPHOLINE	0,92		a	IIA	IIA
2055	STYRENE, monomer		1,21	b	IIA	IIA
2056	TETRAHYDROFURAN	0,87		a	IIB	IIB1
2057	TRIPROPYLENE (nonene)				IIB ⁴	IIA
2078	TOLUENE DIISOCYANATE				IIB ⁴	IIA
2205	ADIPONITRILE				IIB ⁴	IIA?
2215	MALEIC ANHYDRIDE, MOLTEN				IIB ⁴	IIA?
2218	ACRYLIC ACID, STABILIZED	0,88		a	IIB	IIB1
2227	n-BUTYL METHACRYLATE	0,95		a	IIA	IIA
2238	p, m or o CHLOROTOLUENE	---		d	IIA ⁷	IIA
2241	CYCLOHEPTANE	---		d	IIA ⁷	IIA
2247	n-DECANE	1,05		a	IIA	IIA
2248	Di-n-BUTYLAMINE				IIA ⁷	IIA
2259	TRIETHYLENETETRAMINE				IIB ⁴	IIA
2263	DIMETHYLCYCLOHEXANEN			d	IIA ⁷	IIA
2264	N,N-DIMETHYLCYCLOHEXYLAMINE				IIB ⁴	IIA
2265	N,N-DIMETHYLFORMAMIDE	1,08		d	IIA	IIA
2266	DIMETHYL-N-PROPYLAMINE				IIA ⁷	IIA
2272	2-ETHYLHEXYLAMINE				IIA ⁷	IIA
2278	n-HEPTENE				IIB ⁴	IIA
2280	HEXAMETHYLENEDIAMINE, SOLID.				IIB ⁴	IIA
2282	HEXANOLS				IIA	IIB1
2286	PENTAMETHYLHEPTANE			d	IIA ⁷	IIA
2288	ISOHEXENEN				IIB ⁴	IIA
2289	ISOPHORONEDIAMINE				IIA ⁷	IIA
2302	5-METHYLHEXAN-2-ONE				IIA	IIA
2303	ISOPROPENYLBENZENE	0,88		a	IIB	IIB1
2306	OCTADIENE (1,7-OCTADIENE)				IIB ⁴	IIA
2312	PHENOL, MOLTEN			d	IIA ⁸	IIA
2321	TRICHLOROBENZENES				IIA ⁷	IIA
2323	TRIETHYL PHOSPHITE				IIB ⁴	?
2324	TRIISOBUTYLENE				IIB ⁴	IIA
2325	1,3,5-TRIMETHYLBENZENE	0,88		a	IIA	IIA
2333	ALLYLACETATE	0,96		a	IIA ⁷	IIA
2345	BUTYLACRYLATEN, n-BUTYLACRYLAAT	0,88		a	IIB	IIB1
2350	BUTYLMETHYLETER				IIB ⁴	IIA
2352	2-CHLOROPROPANE	1,32		a	IIA	IIA
2357	CYCLOHEXYLAMINE				IIB ⁴	IIA
2362	1,1-DICHLOROETHANE	1,82		a	IIA	IIA
2370	1-HEXENE				IIB ⁴	IIA
2381	DIMETHYL DISULPHIDE				IIB	IIA
2388	DIMETHYL HYDRAZINE SYMMETRICAL				IIB ⁴	IIA
2383	DIPROPYLAMINE	0,95		a	IIA	IIB1?
2397	3-METHYLBUTAN-2-ONE				IIA ⁷	IIA
2398	METHYL-tert-BUTYLETER (MTBE)	1,00		a	IIA	IIA
2404	PROPIONITRILE				IIA ⁷	IIA
2414	THIOPHENE	0,91		a	IIA	IIA

MESG

Group IIA: MESG ≥ 0,9 mm.
 Group IIB: 0,5 mm < MESG < 0,9 mm.
 Group IIC: MESG ≤ 0,5 mm.

MIC

Group IIA: MIC > 0,8.
 Group IIB: 0,45 ≤ MIC ≤ 0,8.
 Group IIC: MIC < 0,45.

SUBGROUP IIB

Group IIB: MESG > 0,5 mm.
 Group IIB3: MESG ≥ 0,65 mm.
 Group IIB2: MESG ≥ 0,75 mm.
 Group IIB1: MESG ≥ 0,85 mm.
 Group IIA: MESG ≥ 0,9 mm.

UN Naam

2430 ALKYLPHENOLS SOLID, NOS MOLTEN
 2458 HEXADIENES
 2477 METHYL ISOTHIOCYANATE
 2485 n-BUTYLISOCYANATE or ISOBUTYLISOCYANATE
 2486 ISOBUTYL ISOCYANATE
 2487 PHENYLISOCYANATE
 2491 ETHANOLAMINE
 2493 HEXAMETHYLENIMINE
 2527 ISOBUTYLACRYLATE
 2528 ISOBUTYLISOBUTYRATE
 2531 METHACRYLIC ACID
 2564 TRICHLOROACETIC ACID
 2608 NITROPROPANES
 2615 ETHYLPROPYLETHYER
 2618 VINYLTOLUENE
 2683 AMMONIUM SULPHIDE SOLUTION
 2709 BUTYLBENZENES (n-BUTYLBENZENE)
 2733 2-AMINOBTUTANE
 2789 ACETIC ACID SOLUTION, more than 80% acid by mass.
 2811 TOXIC SOLID ORGANIC NOS (1,3,5, trichlorobezene, MOLTEN)
 2920 HEXADECYLTRIMETHYLAMMONIUM CHLORIDE (50% and ETHANOL 35%)
 2920 2-PROPANOL and DODECYLDIMETHYLAMMONIUM CHLORIDE
 2924 AQUEOUS SOLUTION OF DIALKYL-(C8-C18)-DIMETHYLAMMONIUM CHLORIDE and 2-PROPANOL)
 2924 FLAMMABLE LIQUID, CORROSIVE, NOS
 2929 TOXIC ORGANIC LIQUID,FLAMMABLE, NOS
 2935 ETHYL-2-CHLORO-PROPIONATE
 2947 ISOPROPYL CHLOROACETATE
 2983 ETHYLENE OXIDE AND PROPYLENE OXIDE MIXTURE, WITH ≤ 30% ETHYLENE OXIDE
 3079 METHACRYLNITRILE
 3092 1-METHOXY-2-PROPANOL
 3175 SOLIDS CONTAINING FLAMMABLE LIQUID, N.O.S., MOLTEN
 3256 ELEVATED TEMPERATURE LIQUID,FLAMMABLE, N.O.S.
 3271 ETHERS, NOS. (tert.-AMYL METHYLETHYER)
 3271 ETHERS, NOS. (tert.-AMYL METHYLETHYER)
 3272 ESTERS, NOS
 3289 FLAMMABLE LIQUID, TOXIC CORROSIVE, N.O.S.
 3295 HYDROCARBONS LIQUID NOS, with > 10% BENZENE
 3295 HYDROCARBONS LIQUID NOS,(1-OCTEEN)
 3295 HYDROCARBONS LIQUID NOS,(mixture of POLYCYCL AROMATES)
 3295 HYDROCARBONS LIQUID NOS,CONTAINS ISOPRENE EN PENTADIEN
 3412 FORMIC ACID
 3429 CHLOROTOLUIDINES, LIQUID
 3448 NITROTOLUENES, SOLID, MOLTEN
 3451 TOLUIDINES, SOLID, MOLTEN
 3456 CRESOLS, SOLID, MOLTEN
 3463 PROPIONIC ACID with not less than 90% acid by mass
 3475 ETHANOL AND GASOLINE MIXTURE with > 10% but < 90% ethanol
 3475 ETHANOL AND GASOLINE MIXTURE met > 90% ethanol
 3494 PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC
 9001 SUBSTANCESWITH A FLASHPOINT FP > 60 °C, HANDED OVER FOUR CARRIAGE AT A TEMP WITHIN 15 ° FROM THE FLASHPOINT

FORMULA for MIXTURES

MESC 1)

$$\Sigma_i(X_i/MESG_i)$$

Norm ISO-EIC-DIS 80079-20-1

MESG MIC method.

ADN 2015

IIA^a
 IIB^a
 IIB^a
 IIB^a
 IIA
 IIA
 IIB^a
 IIA
 IIA
 IIB^a
 IIA
 IIA
 IIB^a
 IIA
 IIA
 IIB^a
 IIA
 IIA
 IIB^a
 IIB1
 IIA
 IIA
 IIA
 IIA
 IIB^a
 IIB3
 IIB3
 IIA
 IIA
 IIB3
 IIB2
 IIB1
 IIA^a
 IIB3
 IIB3
 IIB3
 IIB3
 IIB3
 IIB3
 IIB3
 IIB3
 IIB3
 IIA
 IIA
 IIB^a
 IIA^a
 IIA^a
 IIA
 IIA
 IIB
 IIB1
 IIB3
 IIB^a
 IIB3

according to this norm

IIA
 IIA (ADN WP.15/AC.2/2016/4 says IIA)
 IIA similar to METHYLISOCYANATE and thio-groups (all MESG >0,9)
 IIA similar to METHYLISOCYANATE(MESG = 1,21)
 IIA similar to METHYL ISOCYANATE en PHENYL ISOCYANATE (UN 2487)
 IIA similar to METHYLISOCYANATE(MESG = 1,21)
 IIA (ADN WP.15/AC.2/2016/4 says IIA)
 IIA similar to cyclohexan en amines
 IIB1 similar to n-Butyl acrylate (MESG = 0,88)
 IIA
 IIA
 IIB^a
 IIA
 IIA
 IIB2 ADN WP.15/AC.2/2016/4 says IIB2
 IIA
 IIA similar to vinylbenzene (MIC= 1,21)
 IIA according to NH3 and Sulfides IIA
 IIA
 IIA similar to 1-aminobutane (MESG = 0,92)
 IIA
 IIA
 IIA all chloro and benzene connections MESG > 0,9, and ADN WP.15/AC.2/2016/4 says IIA
 IIB1 according to Ethanol IIB1, all chlorides MESG 0,9
 IIA According to propanol IIA, all chlorides MESG > 0,9
 IIA
 IIB3 similar to all ADN class 8 products there is no IIB product, so IIB3 complies
 IIB3
 IIA
 IIA
 IIB3 According to the formula in ISO-EIC-DIS 80079-20-1 for mixtures, ETH oX MESG 0,59 and 30%, prop ox MESG 0,7 and 70%
 IIB2 according to methanentriple (HCN) MESG=0,8
 IIB1 (ADN WP.15/AC.2/2016/4 says IIB1)
 IIA
 IIB3 UN 3256 mainly contains hydrocarbons with large alkane chains and connections with cyclo products MESG > 0,9, so IIB3 complies
 IIB3 similar to diethylene ether (MESG=0,7)
 IIB3 similar to diethylene ether (MESG=0,7)
 IIB1 similar to the products with the smallest MESG within the group acetic acid X esters, ((= Acetoacetic acid methyl ester) MESG= 0,85
 IIB3 according to the toxic propertyts and coorsive propertyts IIB3 complies
 IIB3
 IIB3
 IIB3
 IIB3
 IIB3
 IIB3
 IIB3
 IIB3
 IIA
 IIA
 IIB^a similar to NITROBENZENE MESG > 0,9 en TOLUENE MESG > 1, IIB3 complies
 IIA
 IIA
 IIA^a
 IIA
 IIA
 IIB1 According to the formula in ISO-EIC-DIS 80079-20-1 for mixtures 90% ethanol
 IIB3
 IIB3
 IIB3

Methode according to ISO-EIC-DIS 80079-20-1

a = classified according to MESG determination.
 b = classified according to MIC ratio.
 c = both MESG and MIC ratio have been determined.
 d = classified according to similarity of chemical structure (provisional classification).
 Classificatie van gas mengsels

According to the formula in ISO-EIC-DIS 80079-20-1 for mixtures and the mixture doesn't contain components for what IIB of IIC is described or the mixture contains less 30% of these components. IIB3 complies