Economic Commission for Europe

Inland Transport Committee

27 January 2020
English

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)

Thirty-sixth session
Geneva, 27-31 January 2020
Item 4 (e) of the provisional agenda
Implementation of the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN)
Matters related to classification societies

Update ADN 9.3.4

Transmitted by the Government of the Netherlands

UPDATE ADN 9.3.4

PROPOSAL FOR DISCUSSION AT THE 36TH SESSION OF WP.15/AC.2

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TNO innovation for life

ADN CHAPTER 9.3.4

The last and youngest chapter in ADN

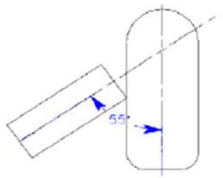
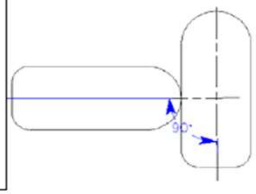
SECTIONS REQUIRING UPDATE/ MODIFICATION

9.3.4.1.1 The capacity of a cargo tank shall not exceed 1000 m^3.

9.3.4.3.1.2.2 *Vertical collision locations*

9.3.4.3.1.3.3 *Longitudinal collision locations*

Tabelle: Geschwindigkeitsreduktionsfaktoren für Fall I oder II mit Gewichtungsfaktoren

				Ursachen		
				Kommunikationsfehler und schlechte Sicht	Technische Fehler	Menschliches Verhalten
				0,50	0,20	0,30
Szenarien der ungünstigsten Fälle	I		Schubleichter-Bugform, Anfahrwinkel 55°	0,80	0,66	0,50	1,00
	II		V-förmiger Bug, Anfahrwinkel 90°	0,20	0,30		1,00

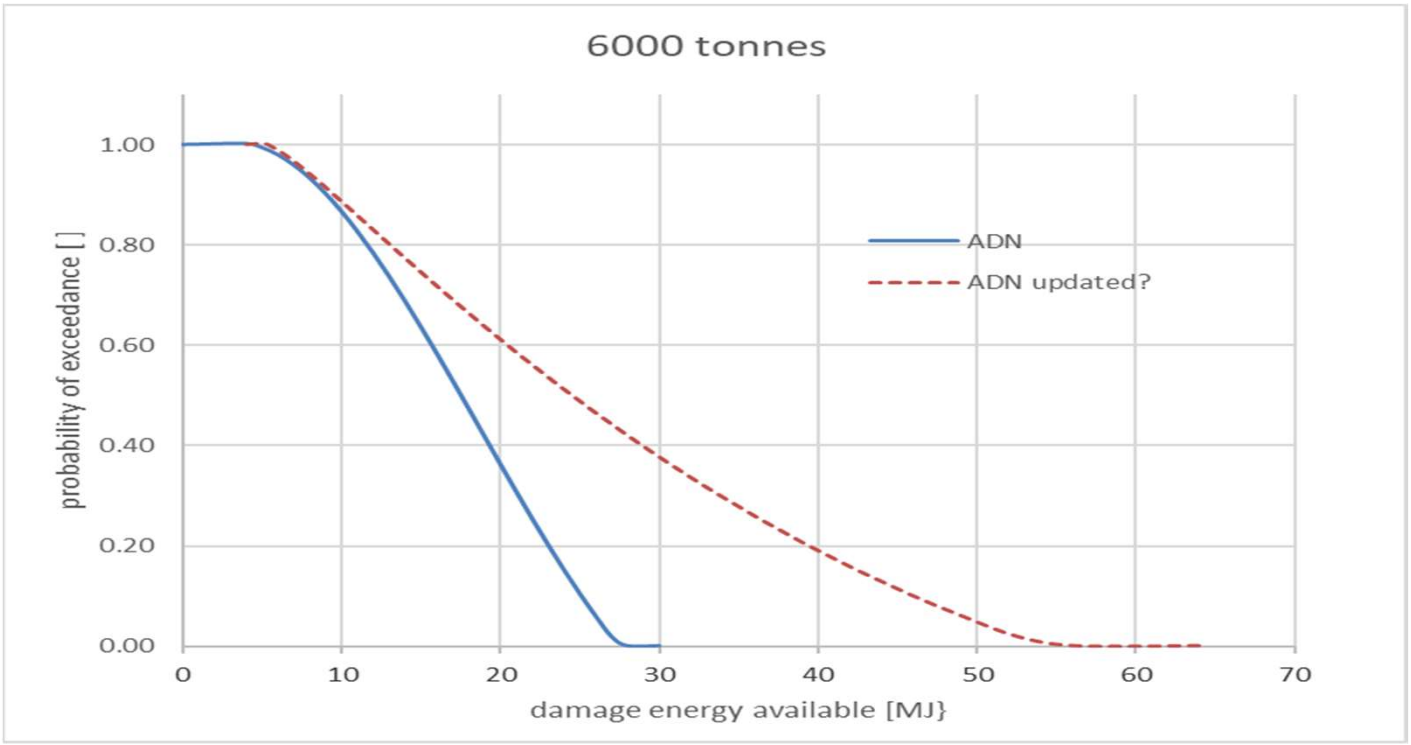
SECTIONS REQUIRING UPDATE/ MODIFICATION

9.3.4.3.1.5 probability of exceedance

$$P_{x\%} = C_1(E_{loc(i)})^3 + C_2(E_{loc(i)})^2 + C_3E_{loc(i)} + C_4$$

Effective mass of struck vessel in tonnes	velocity = 1 x V_{max} coefficients				
	C_1	C_2	C_3	C_4	range
14000	4.106E-05	-2.507E-03	9.727E-03	9.983E-01	$4<E_{loc}<39$
12000	4.609E-05	-2.761E-03	1.215E-02	9.926E-01	$4<E_{loc}<36$
10000	5.327E-05	-3.125E-03	1.569E-02	9.839E-01	$4<E_{loc}<33$
8000	6.458E-05	-3.691E-03	2.108E-02	9.715E-01	$4<E_{loc}<31$
6000	7.902E-05	-4.431E-03	2.719E-02	9.590E-01	$4<E_{loc}<27$
4500	8.823E-05	-5.152E-03	3.285E-02	9.482E-01	$4<E_{loc}<24$
3000	2.144E-05	-4.607E-03	2.921E-02	9.555E-01	$2<E_{loc}<19$
1500	- 2.071E-03	2.704E-02	-1.245E-01	1.169E+00	$2<E_{loc}<12$

SECTIONS REQUIRING UPDATE/ MODIFICATION



SECTIONS REQUIRING UPDATE/ MODIFICATION

$$R = P \bullet C$$

Wherein: R risk [m^2],

P probability of cargo tank rupture [ ],

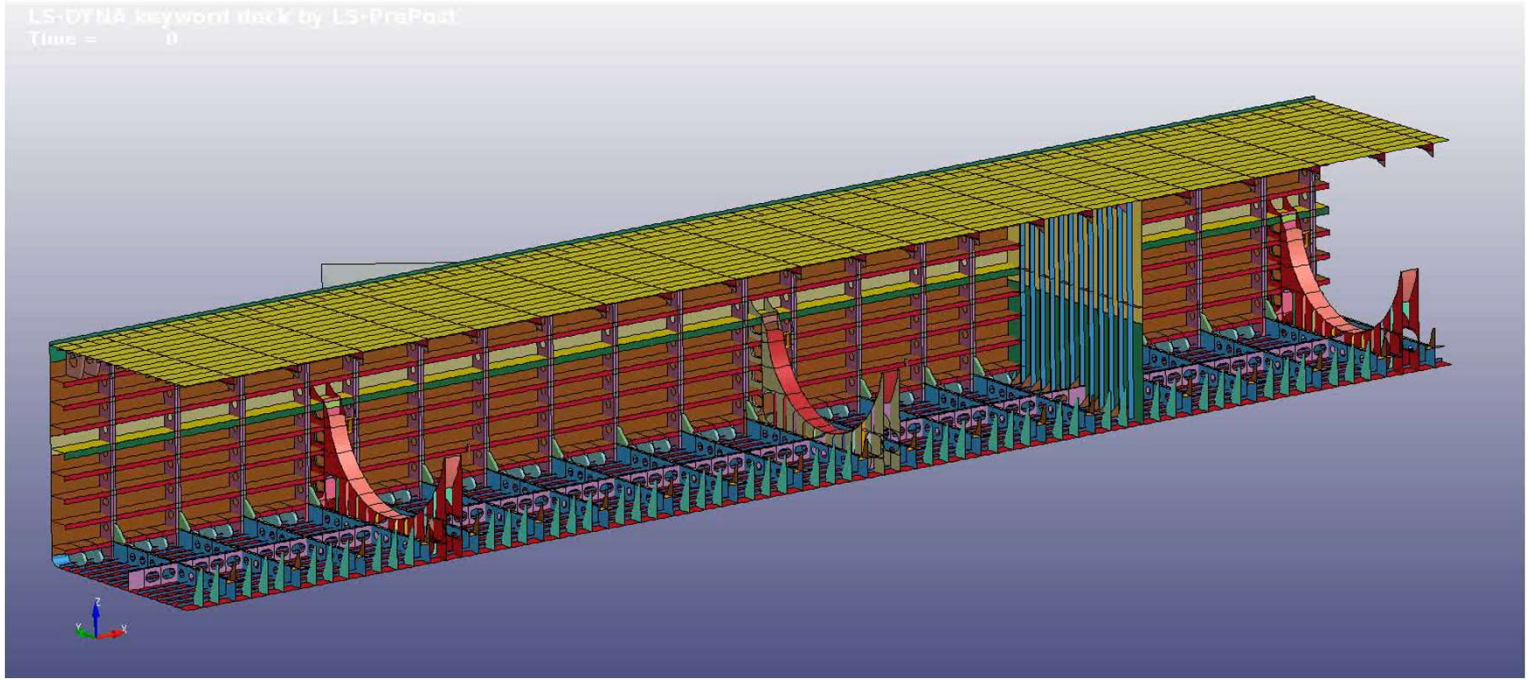
C consequence (measure of damage) of cargo tank rupture [m^2].

$$\frac{C_n}{C_r} \leq \frac{P_r}{P_n}$$

Pn = 0 not explicititly addressed.

SECTIONS REQUIRING UPDATE/ MODIFICATION

9.3.4.4 *Determination of the collision energy absorbing capacity*



SECTIONS REQUIRING UPDATE/ MODIFICATION

9.3.4.4 ***Determination of the collision energy absorbing capacity***

9.3.4.4.2 *Creating the finite element models (FE models)*

9.3.4.4.3 *Material properties*

9.3.4.4.4 *Rupture criteria*

Include data for cryogenic tanks

Update friction definition.
Provide guidance for contact.

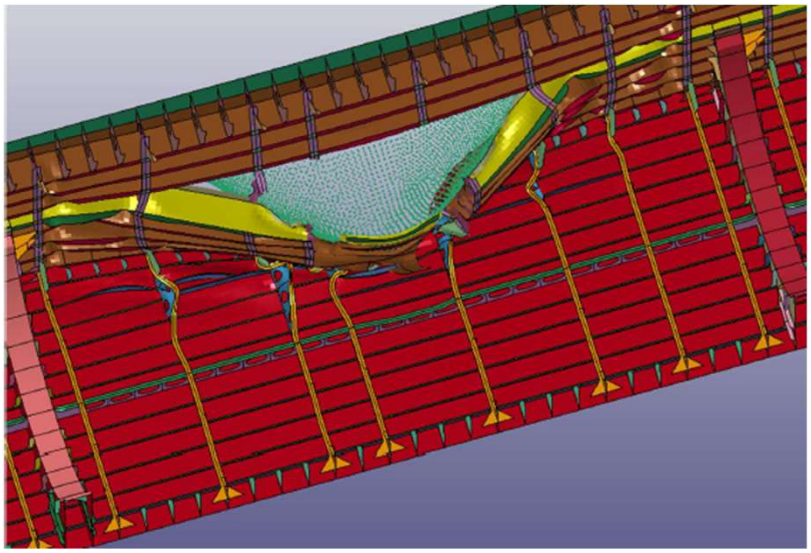
SCOPE OF WORK

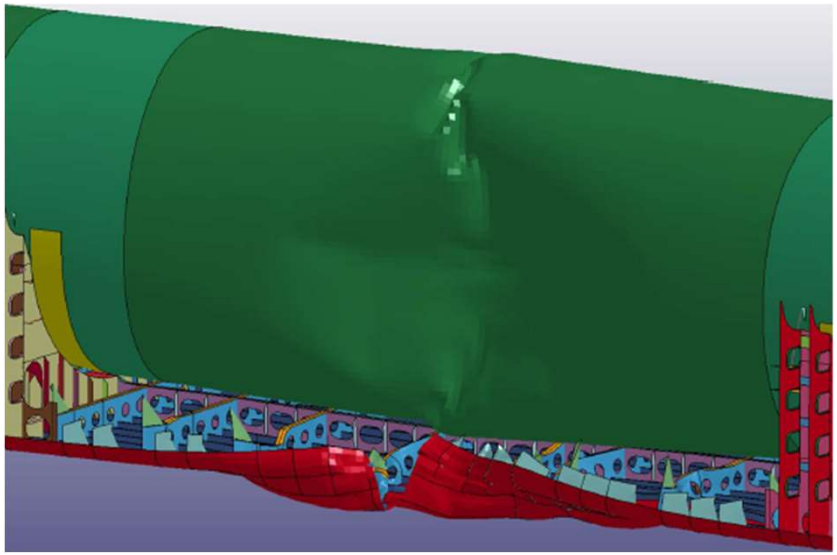
a) develop a sound procedure for dealing with ‘probability nil’ cases (intrinsic safety),
b) replace reference ship by reference energies,
c) reduce # of collision scenarios,
d) update collision energy statistics,
e) identify meaningful fracture criteria for ‘new’ steels,
f) expand the current guidance on how to conduct the FE calculations,
g) reconsider the current 1000 m^3 limit,
h) consolidate results a) through f) in an updated formulation of regulation 9.3.4,
i) discuss results with classification societies and flag authorities,
j) defend results in ADN working party.

WORKING GROUP MEMBERS

1. Damen Schelde Naval Shipbuilding,
2. Bureau Veritas,
3. DNV – GL,
4. Lloyd's Register,
4. …
5. TNO The Netherlands.

		2020												2021			
		Q1			Q2			Q3			Q4			Q1	Q2	Q3	Q4
Task	**Description**	*jan*	*feb*	*mrt*	*apr*	*mei*	*jun*	*jul*	*aug*	*sep*	*okt*	*nov*	*dec*				
0	Establish working group and secure funding																
a	develop a sound procedure for dealing with 'probability nil cases' (intrinsic safety),																
b	replace reference ship by reference probabilities,																
c	reduce # of collision scenarios,																
d	update collision energy statistics,																
e	identify meaningful fracture criteria for 'new' steels,																
f	expand guidance on FE calculations																
g	reconsider 1000 m3 limit																
h	consolidate results a) through f) in an updated formulation of regulation 9.3.4,																
i	discuss results with classification societies and authorities,																
j	defend results in ADN working party.																





Discussion