
Economic Commission for Europe**Inland Transport Committee**

15 January 2019

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-fourth session**

Geneva, 21-25 January 2019

Item 4 (d) of the provisional agenda

Implementation of the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN): training of experts

Follow up to proposal to extend the examination time of ADN 8.2.2.7.1.5 (basic training course) and 8.2.2.7.3.2 (refresher training course)**Transmitted by EBU and ESO**

Reference documents: Informal document INF.11 of the thirty-third session of the ADN Safety Committee meeting and ECE/TRANS/AC.2/2018/43 (minutes of the informal working group on the training of experts)

I. Introduction

1. By presenting informal document INF.11 during the thirty-third session of the ADN Safety Committee, EBU/ESO dropped the proposal to consider an extension of the duration of the ADN-exams.
2. This proposal was made as the ADN has increased in the last years both in quality and quantity and it is experienced by different parties that in many cases, the time of the exams is too short to examine a participant in an effective way on his/her knowledge of the ADN and his/her skills to work with it. EBU/ESO proposed to extend the average time to answer an examination question from 2 minutes/question to 2,5 minutes/question.
3. During the thirty-third session of the ADN Safety Committee, this topic was discussed. It was considered that the information provided so far did not justify a modification at that time.

II. Follow up regarding proposal informal document INF.11 of the thirty-third session

4. After the thirty third session of the ADN Safety Committee, EBU/ESO met the members of the inland industry associations, training organizers and instructors and discussed the topic again. The topic was also discussed with the Dutch competent authority for dangerous goods exams ADR, RID and ADN (CCV).

5. It was concluded, it should be useful to let an independent party, with a didactic and educational background, investigate the hypothesis.
6. The company ISEO Consult was asked to investigate the topic. ISEO Consult is a specialized in the field of research, development and advice on education in the labour market. They have performed several studies and advised schools, companies and the government in the Netherlands.
7. Their report “Research report ADN-exams” is attached as appendix to this document
8. Based on exam statistics, the question catalogue, the ADN and considering the average crew member education and linguistic level, it is concluded (page 10) by ISEO Consult that:
 - (a) Time-constraints experienced by candidates can mainly be traced back to their language level, which is averaged at the level of A2;
 - (b) A higher language level is demanded in the exam questions (B1/B2) and even more the legal text of the ADN (C1) than the average language level of the candidates (which is A2);
 - (c) It is independent of the knowledge of the candidate if he can or cannot process within the available time, but caused by the language level gap;
 - (d) An extension of the average examination time seems realistic, as other options seem unrealistic.
9. Besides, ISEO Consult remarks that for the future it could be considered to limit the questions’ answers in the catalogue from 4 to 3 options, as it is a tendency in the field of educational sciences that working with 2 multiple choice options is found to be more efficient.

III. Safety impact and argumentation

10. There is no safety impact. People who do not have studied sufficiently will still not be able to pass their exam by providing a bit more time. For most people it will be more comfortable to do an ADN-exam without the major stress of time. They will be able to focus more on the content of the exam and have sufficient time to prove their skills, dealing with the linguistic challenge.
11. It should be taken into account that most ADN-experts are no academically educated people but hard working practical people. It is important to have a fitting system to test their ADN-knowledge and skills in an appropriate way.

Annex

**Report “Research report ADN-exams” of ISEO Consult,
December 2018, English version.**



Research report ADN-exams

1. Accountability

This report is the presentation of a research in response to the proposal that the international representation of the inland shipping sector has made.

The literature review described in this report focuses on extensive documentation regarding the ADN exams, the target group for these exams and other relevant factors. These documents were provided by the Central Office for Rhine and Inland Shipping and the CBR / CCV. In addition, ISEO contributed its own expertise and conducted literature research in the field of language and language levels. A source list can be found at the back of the report.

The research was conducted within ISEO Consult by drs. A.H.A. (Sandra) Dollenkamp and mr. C.M.G. (Claire) Freling. The expertise of ISEO Consult is in the field of research, development and advice on education in the labour market. ISEO Consult works for schools, companies and the government.

Examples of completed projects that are relevant in this respect:

- Comparative study of job profiles in Inland navigation in Europe. We looked at how the job profiles from the various member states could be compared to the common framework (EFQM), where all job profiles can be tested.
- Research and advice on professional profiles and education structure for, among others, dental technology, optics, hairdressing, logistics and transport, mental health care, the graphics sector, hearing aid professionals and orthopedic shoemakers.
- Research into the consequences for the trainers and examinations with regard to the implementation of the new professional competence directive (2003/59 / EC).
- Advising on setting up and implementing exam institutes in the Netherlands, in accordance with legal requirements and regulations (for example logistics, medical pedicures and beauty care).
- Development of teaching materials for Dutch and foreign languages in vocational education, in accordance with the predetermined levels (linked to NLQF, EQF and CERF).

2. Motivation

The ADN Certificate is mandatory for the 'responsible skipper' in accordance with 7.1.3.15 and 7.2.3.15. Everyone must have specifically followed "training" in accordance with ADN 1.3. "Instruction of persons involved in the transport of dangerous goods".

The sector has the express wish to have all persons on board obtain an ADN Certificate. This in order to increase the general level of knowledge and necessary for the promotion of sailors / helmsmen to 'responsible skipper'. In the professional skipper / helmsman training, ADN is therefore a compulsory component, regardless of whether the student will be transporting dangerous goods or not. However, there is an undesirable effect that arises from the difficulty of ADN: those who do not obtain their ADN diploma also do not get their MBO diploma. For that reason, potential good skippers fail and seek jobs in other professions.

The pass rates for the initial ADN exam are low. One of the factors that play a role here is the available time for an exam. In practice there are many candidates who run out of time. The platform of trainers and the inland shipping sector strongly suspect that extending the exam duration by an average of half a minute per question will ensure that more people are able to demonstrate that they have the right level of knowledge. In order to check whether this assumption is correct, ISEO Consult was asked to examine the ADN exams.

3. Research question

Is it justified - and if so on what grounds - to extend the duration of the various ADN exams (ADN Basic and ADN Refresh) by half a minute per question?

Framework

The research focuses on the possible causes of the relatively low success rates, particularly in the initial ADN examinations. In doing so, notice is taken of the fact that candidates experience a structural lack of time during the ADN exam and trainers also consider the time available for the exam as a problem.

The substantive requirements linked to the exam are linked to legislation and regulations and are not discussed in this research. Anyone who is working with hazardous goods in Inland Navigation must be able to demonstrate that they are aware of the applicable laws and regulations in that area.

In view of their background (VMBO / MBO-level), it is understood that the candidates are capable of understanding the content of the ADN material after a course or training in this area.

The items that make up the exam are included in a public joint international exam bank, which falls under the responsibility of UNECE. Both item and test construction are performed with the utmost care by experts. ISEO Consult therefore did not look at the examinations regarding content validity, concept validity, criterion validity, standards and the like. It is assumed that these matters are in order.

4. Analysis of the ADN exams

4.1 The examination

In accordance with ADN 8.7.7.2, the ADN exams in the Netherlands are written (digitally or on paper) and the exams vary in length. The initial exam is digitally administered, contains 30 questions and lasts 60 minutes. The responsible authority or an exam institution appointed by this authority must supervise. The refresher exam is taken on paper, contains 20 questions and takes 40 minutes. The training institute will take this written final test at the end of the refresher course.

4.2 The censorship

The ADN examinations involve an absolute norm, i.e. the pass rate depends exclusively on the individual candidate's score.

A standard norm of 83% applies to the ADN basic course exams (ADN 8.2.2.7.1.5) (30 questions, of which at least 25 must be answered correctly). For the ADN refresher exams (ADN 8.2.2.7.3.2), a standard of 80% applies (20 questions, of which at least 16 must be answered correctly).

From the point of view of educational sciences, there is a generally accepted pass rate for exams in this form (multiple choice questions, four alternative answers).¹

However, a comment can be made about the number of choices (wrong alternative answers) for each question. In practice, multiple choice questions most often have three options. However, in the field of educational sciences, multiple choice questions increasingly state that working with two options is more efficient. In many cases, the third option adds little to

¹ Sources: 7

the quality of the exam, while it requires a relatively large amount of effort from the exam setters.²

The examination form (paper versus digital)

In the Netherlands, the basic ADN exams are taken via computer-based testing. These examinations are administered by the CBR / CCV, which has been approved by the Ministry as the competent examination institute. The refresher exams are taken on paper by the trainers. The exam structure is identical for both exams.

Comparison teaches us that the success rates differ: on the refresher exam, the score is structurally higher than on the basic exam. However, it is not likely that this difference is caused by the examination form:

- Various scientific studies³ show that the effect of computer based testing of candidates' performance is minimal in comparison to the paper exam.
- Candidates are often already familiar with computer-based testing these days, because this form has been used for years, including the theory examinations for the B driving license, Rijnpatent, Safety Advisor, ADN, ADR and RID.

All in all, it can be ruled out that the digital form in which the basic examinations are administered provides a sufficient explanation for the low success rates. Switching from digital to paper testing for the basic examinations will not solve the problem of lack of time.

4.3 The character of the exams

The exam questions often contain a lot of reading text. The choices regularly seem to be very similar to the correct answer. Only a detail, for example a word as 'is' or 'not', forms the distinction between the correct answer and incorrect alternatives. This requires quick and accurate reading.

In addition, characteristics of the reference works (legal texts, large amounts of information) are relevant to the character of the examinations. The exam consists largely of questions in which the candidate must look up information in these reference works. This often goes via a table (with or without references), after which other sections need to be found in the ADN Regulations, which encompass over a thousand pages and consist of legal texts with all kinds of exceptions and transitional provisions. Targeted and quick information search is needed to answer the questions correctly. This requires that candidates have to function at a reasonable level when it comes to reading comprehension.

The working through of large amounts of text and documents, which offer the less experienced reader little support when studying them, asks a lot of the candidates. Moreover, the search takes more time than before, because the amount of material that underlies the exam has become increasingly extensive over the years. The available time allotted to the ADN exam has never been adjusted accordingly.

The exam results

The analysis of the exam results is based on data provided by the CBR and the CBRB.

The questions that make up the exam are prepared by experts, an activity that falls under the training group ADN of the ADN Safety Committee. The exams⁴ are composed on the basis of solid test matrices. It is therefore not to be expected that some exams are significantly

² Sources: 8

³ Sources: 9

⁴ Sources: 3

more difficult than others. Based on a random sample⁵, it has been confirmed that there is no large variation in difficulty between the exams which are taken at different times. This determination is relevant because it excludes that lower success rates and experience of lack of time can be related to the 'more difficult' examinations.

Making a reliable international comparison is difficult, if not impossible. The various countries report their success rates annually, but in many cases this report relates to (very) small numbers of candidates. To illustrate: the number of Dutch candidates was higher in 2016 than the number of candidates from all other countries combined.

4.4 The target group

The target group for the ADN examinations are mainly crew members in inland navigation in the transport of hazardous goods. They usually have an education at VMBO level or a maximum MBO level. That means: level 2, 3 and 4 of the European Qualification Framework respectively.⁶

The Netherlands has a working population with a high average level of language skills. Nevertheless, a significant group of people in the Netherlands is low literate: 12% of people between 16 and 65 have difficulty reading, understanding and using relatively simple texts, in digital form or on paper. Low literate means that they function in terms of language proficiency at a level lower than MBO 2/3.⁷ Qualitative research among various educational institutes shows that the language level of the candidates for the ADN exam is on average A2.⁸

It falls outside the scope of this research to comprehensively compare the target group in the different countries, but based on the data examined there is no reason to assume that the character of the target group for ADN differs greatly in the various countries. .

That language level of the target group is an important starting point. Earlier (see section 5.4) we concluded that the ADN exam is a 'linguistic' exam that involves a lot of reading. The exam questions can be placed at language level B1 / B2. The language level of the ADN itself (legal texts) can be set at C1.⁹ Some articles from the ADN are included in Appendix 1, for illustration purposes.

The language level A2 of the candidates implies that they are readable, when it concerns texts with simple sentences with simple conjunctions and an average sentence length of about ten words. The relevant texts are short and predominantly have a low information density. The reader at level A2 can read simple charts and tables, with no more than two variables supported by a clear layout and images with the text. It can be concluded that there is a mismatch between the language level of the ADN / exam (B2) and that of the average candidate (A2).

5. Conclusion

The time-constraints experienced by candidates can mainly be traced back to their language level, which is averaged at A2.

A study of various examinations show that they clearly demand a higher language level than A2. This has to do with the exam questions (B1 / B2) as well as with the character of the reference works to be used (C1).

⁵ Sources: 4 + 5

⁶ Sources: 14

⁷ Sources: 12

⁸ Sources: 10 + 13

⁹ Sources: 11

The average ADN candidate is confronted with large amounts of text during the exam, which he cannot or barely process within the available time. This is independent of his knowledge of the exam material. A candidate who has sufficient knowledge of the exam material also runs a real risk that he will have insufficient time.

In short, it is the combination of language level, the limited time that candidates get for the exam and the growing size of the reference books, which is increasingly a problem for this target group.

6. Advice

7.1 Examination time

Reducing the size of the European contract for the international transport of dangerous goods by inland waterways (ADN) is not an option.

Bringing the language level of the candidates to level B2 / C1 in the short term is not a realistic option.

Adjusting the pass mark of the exam is not a solution, because it falls within the usual bandwidth.

Then the conclusion remains that the solution must be sought in extending the exam time.

The primary goal of the ADN exam is to objectively determine the level of knowledge of the candidate and thereby guarantee safety when working with hazardous goods.

The exam time factor seems to play a dominant role at the moment. In working life, however, there is no time pressure if someone has to look up something whilst on board. A person who has to work with hazardous goods will take the necessary time to properly investigate an issue. All in all, it seems desirable to reduce the time pressure during the exams. Candidates will then have a better chance to demonstrate how well they manage the content.

The proposal is to extend the time for both exams slightly.

An extension from an average of two minutes to an average of two and a half minutes per question, as the industry suggests, seems realistic. This would mean that the ADN Basic Examination would take 75 minutes. ADN refreshers would have a duration of 50 minutes.

Within the government and education department, there is also a renewed interest in the importance of language development and management in order to function socially. It is advisable to monitor how the language level of the average candidate develops in the future and to periodically review the extent to which the examination period again requires adjustment.

7.2 Examination questions (number of choices)

In 5.2 we already established that the current exam consists of questions with four options (the correct answer and three alternative choices). However, in the field of educational sciences, multiple choice questions increasingly state that working with two options is more efficient. In many cases, the third option adds little to the quality of the exam, while it requires a relatively large amount of effort from the exam setters.

For consideration: reducing the number of options per question to two, could be an extra solution, in addition to extending the time. This solution also addresses the problem of the language level and would mean less reading for the candidates.

Consulted sources

European Agreement for the International Carriage of Dangerous Goods by Inland Waterways (ADN) version 2017. The Hague: Ministry of Infrastructure and Public Works.

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Buisman, M and W. Houtkoop (2014). Laaggeletterdheid in kaart. 's Hertogenbosch: ecbo / Stichting Lezen & Schrijven.

Common European Framework of Reference for languages (CEFR) (2018). Strasbourg: Council of Europe, Education Department.

The European Qualifications Framework: supporting learning, work and cross-border mobility (2018). Luxembourg, Publications Office of the European Union.

Appendix 1:

Examples of texts from the ADN

7.1.2.0 Authorized ships

7.1.2.0.1 Dangerous goods may be carried in quantities not exceeding those stated in 7.1.4.1.1 or, if applicable, in 7.1.4.1.2:

- in dry cargo vessels in accordance with the applicable construction regulations from 9.1.0.0 to 9.1.0.79; or

- in seagoing vessels in accordance with the applicable construction regulations from 9.1.0.0 to 9.1.0.79, or otherwise in accordance with the requirements of 9.2.0 up to and including 9.2.0.79.

7.1.2.0.2 Dangerous goods of classes 2, 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 7, 8 or 9, with the exception of those for which a hazard label model number 1 is required in column 5 of table A of Chapter 3.2 is required to be carried in quantities in excess of those specified in 7.1.4.1.1 and 7.1.4.1.2:

- In double-hull dry cargo vessels in accordance with the applicable construction regulations from 9.1.0.80 to 9.1.0.95; or

- In double-hull seagoing vessels in accordance with the applicable construction regulations from 9.1.0.80 up to and including 9.1.0.95, or otherwise in accordance with the requirements of 9.2.0 up to and including 9.2.0.95.

7.2.3.7 Degassing of empty cargo tanks

7.2.3.7.0 Degassing of unloaded or unloaded cargo tanks to the atmosphere is only allowed under the following conditions if it is not prohibited by other international or national statutory regulations.

7.2.3.7.1 Unloaded or empty cargo tanks having previously contained dangerous goods of Classes 2 or 3 with a Classification Code containing the letter "T" in column (3b) of Table C of Chapter 3.2, of Class 6.1 or of Class 8 packing group I may only be degassed by authorized persons in accordance with subsection 8.2.1.2 or by undertakings approved for that purpose by the competent authority. Degassing may only be carried out at locations authorized by the competent authority.

7.2.3.7.2 Unloaded or empty cargo tanks, which contain dangerous goods other than those mentioned under 7.2.3.7.1, may be degassed during navigation or at places approved by the competent authority with the aid of suitable ventilation devices, provided that the tank lids are closed, and the discharge of the gas / air mixture takes place via flame-arresting devices, which can withstand a duration fire. Under normal operating conditions, the concentration of product must be less than 50% of the lower explosion limit at the point of exit from the gas / air mixture. Suitable ventilation devices for suction degassing may only be used with a flame-arresting device fitted directly on the suction side of the fan. The gas concentration must be measured every hour by an expert as referred to in 7.2.3.15 during the first two hours after the start of degassing with the blowing or sucking action of the ventilation devices. The measurement results must be recorded in writing.

7.2.3.7.3 If the degassing of cargo tanks which have contained the dangerous substances mentioned in 7.2.3.7.1 at the sites designated by the competent authority or approved for this purpose is not practical, it may be degassed during navigation, provided Which:

- the requirements in 7.2.3.7.2 are met, however, the gas concentration in the blown-out mixture at the place of exit may not exceed 10% of the lower explosion limit;

- danger to the crew is excluded;

- all accesses and openings of rooms that are connected to the outside air are closed. This does not apply to air supply openings of the engine room and to ventilation systems with overpressure;
 - wear appropriate safety equipment for deck crew members;
 - this does not take place in the vicinity of locks, including their fore ports, under bridges or in densely populated areas.
-