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## **NAndtB/24 – Near Vision Standard**

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## FOREWORD

This document has been prepared by the UK NANDTB to address near vision acuity for NDT personnel where EN 4179/NAS 410 requirements apply.

## INTRODUCTION

Standards for NDT Personnel qualification and certification require that the visual acuity of inspection personnel is verified as being appropriate to their function. EN 4179:2009 (NAS 410 Rev 3) specifies the requirement in terms of Snellen notation whilst EN 473 and ISO 9712 use other notation. The detail of the test to be carried out is not included within these standards and the purpose of this document is to provide a standardised procedure for evaluation of near vision acuity for such personnel

Responsible Level 3 individuals are unlikely to have adequate knowledge and expertise to correctly identify equivalency of near vision acuity tests particularly where some are based on reading text and others on identifying individual optotypes.

The UK NANDTB therefore provides this standard for near vision and confirms equivalence as stated herein. No other near vision test shall be carried out as an equivalent test to demonstrate compliance.

### 1. SCOPE

This document specifies the form of the optotype, the test procedure and the acceptance level for near vision acuity of NDT personnel. It also addresses the qualification requirements for personnel permitted to carry out the test.

This standard only addresses near vision acuity under defined conditions similar to those encountered during routine NDT inspection. It does not address an individual's overall visual acuity and users are advised to consider the need for a general eye examination by specialist medical personnel to ensure general vision acuity is appropriate for job function.

This document does not address colour vision requirements.

### 2. NORMATIVE REFERENCES

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 4179, *Qualification and certification of NDT personnel — General principles*

EN 473, *Non-destructive testing – Qualification and certification of NDT personnel – General Principles*

ISO 9712, *Non-Destructive Testing – Qualification and certification of personnel*

NAS 410, *Certification and Qualification of Non-destructive Test Personnel*

### 3. TERMS AND DEFINITIONS

For the purposes of this document, the terms and definitions given in EN 4179 and the following apply.

### **3.1 optotype**

the E shaped character of defined proportions and of various sizes that are used to verify near vision acuity

### **3.2 eyewear**

any form of lens or protective transparent material placed or used between the human eye and the work piece during routine NDT inspection operations.

## **4. CHART PRINT QUALITY**

It is recognised that charts produced locally will have varying print quality and resolution. The chart design, including the two separate blocks of characters and the procedure have been developed to ensure that meeting the defined level will demonstrate compliance. Failure to meet the defined level of acuity, in some cases, may be due to the quality of the test chart produced. Care should be exercised to ensure that the quality of the test chart is appropriate and where personnel fail to meet the required level the quality of the chart should be reviewed before declaring an individual has inadequate near vision.

## **5. HEALTH AND SAFETY**

All relevant European, national and local dispositions regarding health and safety shall be respected. Care shall be exercised when measuring the eye to chart distances.

## **6. PERSONNEL ADMINISTERING THE TEST**

Personnel shall be adequately trained before administering this test. Training and delegation of personnel authorised to conduct tests shall be the responsibility of the Responsible Level 3. Such nominations shall be made in writing and form part of the formal records for that individual.

Medical personnel including Optometrists are not exempt from this requirement.

## **7. TEST CHARTS**

Test charts shall be prepared in accordance with this document and can be obtained from UK NANDTB or downloaded from it's website.

Charts shall be printed in black ink on white paper. The printing equipment and the paper used shall be of an adequate quality for the purpose. This shall be verified practically by using magnification. The two blocks of optotypes (Annex A) have been developed to accommodate the different types of printing equipment commonly encountered. The block which prints best shall be used. This can be determined under good lighting conditions using approximately 10X magnification. Inspect lines 9 and 10 and verify that the lines forming the limbs of the E characters on line 9 are all continuous and generally of an even appearance. There should not be any excessive spread of the print material such that the gaps between the limbs are not visible. Line 10 characters may not all be perfectly formed due to the very small size and since it is not necessary to distinguish this line for compliance the quality of this line does not form part of the acceptance criteria for the chart. It is, however, desirable that the overall shape of each optotype should be discernable under magnification with the limbs and gaps being evident.

The size of the optotype is important and the prepared charts include size verification marks. Printed charts shall be verified to be the correct size by measurement. The annotated 250mm distance between the defined marks shall be measured and shall not be less than

245mm nor more than 255mm. Printing errors could affect vertical and horizontal scaling differently therefore before use it shall be verified that the basic shape of the individual optotype characters is square. This may be verified on the larger characters.

Prepared charts will have randomly orientated individual optotypes and the actual chart to be administered to an individual shall not be made available to that person prior to the test being carried out. Similar charts may, however, be provided to demonstrate what will be required during the test.

## **8. TEST PROCEDURE**

### **8.1 Illumination Level**

The test shall be administered under controlled lighting conditions. Visible, white light of 500  $\pm$ 200 lux shall be used to illuminate the chart. This shall be measured at the position of the chart using a calibrated visible light meter. Whenever possible the stated value of 500 lux, or a value close to this level shall be used and the wider tolerance level shall only be used where adjustment of the illumination source limits the level of illumination. It is preferred that the general illumination level in the area where the test is carried out is low. Higher levels of background may adversely affect results. Spurious light sources, bright objects etc should not be present within the field of view of the candidate.

### **8.2 Eye to Chart Distance**

The chart shall be positioned on a flat surface and the candidate shall move towards the chart to the test distance of 400  $\pm$ 25 mm. At no time shall the candidate be permitted to get closer to the chart. A ruler or gauge stick may be used to verify the distance and the accuracy of measurement shall be appropriate but detailed calibration is not a requirement. Care shall be exercised when measuring or verifying the eye to chart distance.

### **8.3 Eyewear**

Candidates shall wear the same eyewear, if any, as used during routine NDT inspection. This may be personal protective equipment and/or corrective lenses. Lenses used during an eye examination and not intended for regular use shall not be permitted.

Where corrective lenses are necessary to achieve the required level of near vision acuity this shall be specifically recorded as part of the results of test.

### **8.4 Candidate's Responses**

It is expected that the candidate will be able to identify the orientation of each of the individual optotypes. The normal response will be to define where the open end of the E character is so responses of "UP, DOWN, LEFT and RIGHT" would most frequently be used. However any unambiguous form of response verbal or visible may be used. The candidate and the examiner shall establish the method of communication prior to the administration of the test.

### **8.5 The Test**

The test shall be carried out under the conditions defined above and shall not be limited to a test of an individual eye. Generally both eyes shall be used together as for normal NDT inspection. Limited, or no vision in one eye does not preclude a candidate from taking the

test however care should be exercised to make sure that any other requirements for binocular vision are accommodated.

The examiner will have established which of the two blocks of optotypes are to be administered as the test and the chart may optionally be identified by a pen line through the redundant block.

The candidate shall identify the characters starting from the left side of line 1 moving to the right until a response is given for each of the 5 characters. This shall be repeated for lines 2 onwards until the candidate reaches the limit of their capability.

Confidence can affect results and candidates shall be encouraged to provide answers even when they express some uncertainty in their ability to identify the characters. The larger characters should be easily identifiable and should be used to relax the candidate and ensure good communication between examiner and candidate before the limit of acuity is reached. The examiner should prepare a results sheet in advance or record the candidate's response in a manner that allows verification of correctness.

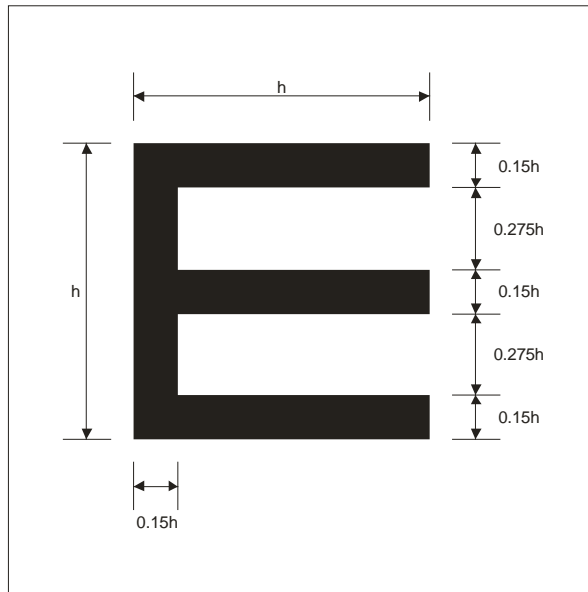
## **9. ACCEPTANCE LEVEL**

Near vision acuity is considered acceptable where the candidate correctly identifies all the individual optotypes (5 out of 5 on each line) for lines 1 to 9 inclusive.

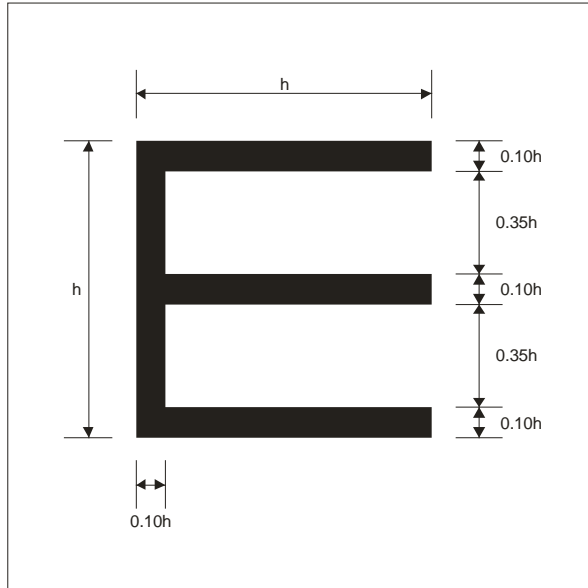
Where a candidate fails to achieve this the examiner shall verify that the test chart or test conditions were not the cause of failure before sending the candidate for further tests for corrective lenses or a more comprehensive assessment of near vision acuity.

## Annex A

The format of the optotypes for the left hand block (Block A) and the right hand block (Block B) of the reading chart are shown in the diagrams below



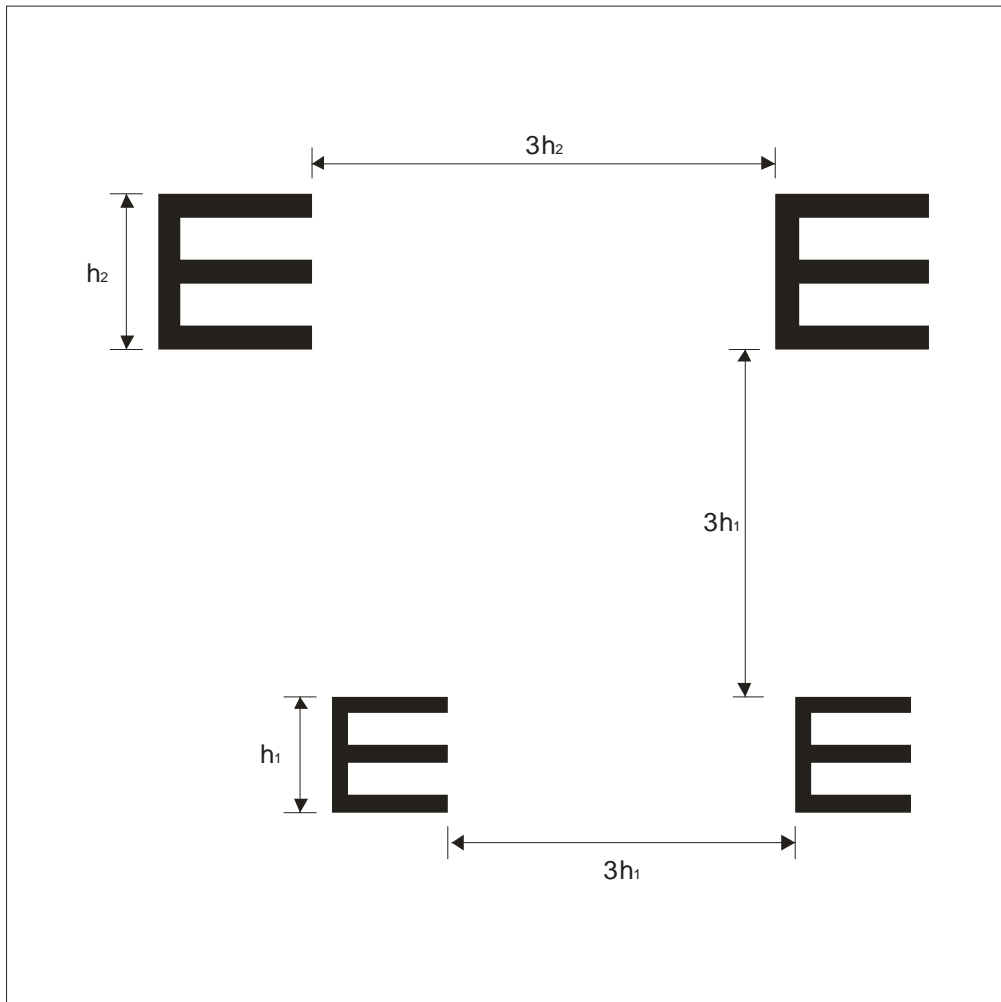
Optotype Format Block A



Optotype Format Block B

## Annex B

The spacing of the optotypes for the two blocks is shown in the diagram below



# Annex C

## NDT Near Vision Acuity Test

To be administered at a minimum distance of 400mm using white light of >500 Lux, using both eyes and with prescription lenses as used for inspection purposes.

