

Examiner's report

Qualifications Framework

Stage 2: Weights and Measures

Written Examiner's Report May 2024

Section A

Q1

This question proved to be problematic as it did not appear in this form on the exam paper. Two of the candidates answered it well. The answer can be found in T.1.2 of EN45501(2015). It is important that candidates understand all of the definitions that are used in legal metrology, and these can be found in the definitions section of the EN45501

Q2

The understanding of the significance of desiccating products are important in order to have a full comprehension of the Packaged Goods Regulations 2006. Examples are soap, cheese, sausages, bread and white spirit. (Reference to this is found in WELMEC 6.3 and WELMEC 6.10). The Packaged Goods Regulations 2006 provide a defence in respect of desiccating products if it can be shown that the packages were made up in accordance with reg 4(1), and that a subsequent failure to pass a reference test was due solely to desiccation after the packages had been made up. This would be up to the packer to demonstrate under Regulation 19(3)

This question was generally answered well by candidates and showed a good level of understanding.

Q3

This is an old but significant part of the Weights and Measures Act 1985 and is still operated in many authorities. Section 18 the Act creates the need for any person attending public weighing and measuring equipment in respect of the use of which a fee is charged to hold a certificate from a chief inspector of weights and measures to the effect that that person has sufficient knowledge for the proper performance of his duties. A certificate has validity in all areas and appeal to the Secretary of State lies in the case of refusal to grant. Personal weighing or measuring machines are excluded. Section 19 enables local weights and measures authorities to provide and maintain public weighing or measuring equipment. Persons employed to operate the equipment must be certified in accordance with s 18. Section 20 creates offences for these sections.

Q4

This question is similar to question 1 and is testing the candidate's knowledge of the technical definitions in EN4550. An extended displaying device is a device which will temporarily changing the actual scale interval, d , to a value less than the verification scale interval, e , following a manual command. On a 50t weighbridge with 20kg division the extended displaying device will show 2kg. This can be used for the calculation of the errors with having to use delta weights and would be used when carrying out verifications or inspections. The extended displaying device is not the e -value and would need to be removed after the verification or inspection has been completed.

Q5

This question is testing the knowledge of the Weights and Measures Orders that relate to food and other goods. It is a detailed question and was generally answered well by all of the candidates. Article 5 of the Weights and Measures Act 1963 (Cheese, Fish, Fresh Fruits and Vegetables, Meat and Poultry Order) 1984 (known as the Pic-Nic order) covers fresh fruit and vegetables of any description. Both of these will be pre-packed as defined in S94 of the WMA as they are made up in advance ready for retail sale in or on a container. Container includes a wrapper or a confining band

Pre-packed goods covered by this article must be marked with a weight or number if they are countable products. Schedule 1(Part 1) has countable products and bananas are countable. No number needs to be marked if there are 8 or less and they are all visible. Any products in Schedule 1 (part 2) can be sold by the bunch. Carrots are 'bunchable' and therefore do not need to be weight marked.

Q6

This question has appeared before and is testing the candidate's knowledge of the procedures relating to standard temperature accounting. A good knowledge of the relevant guidance notes is important here. Under the Weights and Measures Act 1985 (and the Units of Measurement Directive transposed by the Units of Measurement Regulations 1986 (SI 1986/1082) as amended), the litre is expressed as a dimensional quantity and is equal to 1 cubic decimetre. The quantity is not defined at any specified temperature. The temperature of the liquid fuel dispensed can vary due to the influence of various factors, for example the temperature of the underground or lorry mounted storage tanks, the temperature of the fuel delivered from the refineries, and the temperature of the equipment itself. The legal tolerances for the equipment (the maximum permissible errors) have been agreed at national, European, and international levels. The magnitude of tolerance is chosen to provide an acceptable level of accuracy while providing a similarly acceptable allowance for the uncertainties of the measurement being made (which can include the temperature of the fuel being measured

The UK Government has produced 'Guidance Note for retail fuel dispensers (Petrol Pumps) and Road Tanker Mounted Meter Measuring Systems Fitted with Standards Temperature Accounting (STA) Displays. This includes advice for retailers, manufacturers, local authority Trading Standards Officers and Approved Verifiers

The testing procedure is in Annex A of this document and must be referred to in detail in the answer

Section B

Q7

There is always a long question testing the candidate's knowledge of candidate's knowledge of the Packaged Goods Regulations. This long question tests all aspects of the Packaged Goods Regulations. Regulation 8 (2) of the PGR's state that that for food stuffs in a liquid medium the product must be marked with the net drained weight, and this must be the nominal quantity for the purposes of Regulation 4(which are the Packers Rules). It should also be recorded that net drained weights (food stuffs in a liquid medium) must also be marked under the FIC.

This requirement appears to contradict the definition in Art 2 of Directive 76/211/EC, which states that 'a pre-package within the meaning of this Directive is the combination of a product and the individual package in which it is prepacked'. The definition in the Directive mirrors that in clause 2.9 of OIML R87 which also states that the nominal weight should be the weight of the product and the liquid medium. This is in turn reflected in the WELMEC Guide 6.8.

Many candidates confuse the role of the e-mark with respect to the PGR's. The e-mark, placed next to the nominal quantity, shows that you have complied with the relevant laws. You can add it to pre-packaged products that you sell individually at a constant volume (for liquid products) or weight (for other products) which has been chosen in advance.

The €-mark is not mandatory. However, having it affixed to your products enables you to sell them in the GB without having to check whether you have complied with individual national requirements. The €-mark shows that a product complies with the Packaged Goods Regulations.

This question is testing that Inspectors understand the difference between the equipment that they use for the purpose of reference testing and the equipment used by the packers. The weighing instrument that you use must comply with Section 5 of the Weights and Measures Act and the Local and Working Standards and Testing Equipment Regulations and the technical specifications 7130.

Must also remember that the error on the instrument must be a maximum of 0.2 TNE (TNE for 160g is 7.2 g – therefore $1/5$ TNE is 1.44) so must have at least 1 g intervals. This is outlined in the PGR Guidance Notes

This is testing if the candidate understands the offences under the Packaged Goods Regulations. Some of the packages will exceed twice the tolerable negative error and if the supermarket knows or has reasonable grounds for believing the package has a negative error greater than twice the tolerable negative error, they shall be guilty of an offence.

It is also possible that a batch of the product will have a mean that below the nominal and a reference test may have been failed. This offence has an element of knowing or having reasonable grounds to believe which would need to be demonstrated.

Regulation 4 outlines the obligations of packers and importers. As the supermarket do not import the products into the GB it will be the importer that has the obligation to meet the packer's rules. The three packers' rules should be outlined.

The name and address of the importer into the GB should be marked on the product.

The importer must have sufficient records to show that the requirements of the packer's rules are met. These records must be obtained before they leave the importer's possession.

To carry out physical weight checks on the product that will need to follow the requirements of a reference test in accordance with WELMEC 8.8- "Drained Weight-Guide on the Verification of Drained Weights, Drained Washed Weights and Deglazed weights"

Q8

There is often a long question on the conformity assessment of liquid fuel measuring instruments, and it is an area candidates must have an in depth understanding. With regard to the legislation that respects this, The Measuring Instruments Regulations make a requirement for measuring instrument for the measuring systems which are used for trade for the continuous and dynamic measurement in a quantity not exceeding 100 litres or 100 kilograms of a liquid fuel, lubricant or a mixture of fuel and lubricant to be initially conformity assessed. The Measuring Instruments Regulations do not define "in use for trade and we should look at Section 7 of the Weights and Measures Act. The application only covers the delivery of fuel not exceeding 100 litres. It is probable that the fuel tank of a motor launch will exceed 100 litres (but may not) but if the tank is being "topped up" it will deliver less than 100 litres and still need to be verified.

You would need to carry out tests that ensure it can be meet the essential requirements of the Measuring Instruments Regulations 2016. As these are not stipulated in these regulations or these can mirror the 1995 Regulations, but it is not required but not obligatory. – Minimum (2 litres) 10 litres and 20 (fast only). Should mention the need for the appropriate drain times.

All the errors must be as close to zero as is practicable regardless of whether each error is within the prescribed limits of error as set out in the schedules. The minimum should be as close to the marked minimum as possible- These are the inspection tolerances that should be used

This question tests the understanding of the relationship between the use of metric and imperial units and this subject appears regularly in previous exams. The use of imperial units- Section 8 of the Weights and Measures Act 1985 outlines the units of measurement, weights, and measures lawful for trade in the UK. This allows any unit in Schedule 1 to be used for trade (Schedule 3 covers the linear, square, cubic, or capacity measure) which can be used.

Schedule 1 Allows the use of only metric units.

This would mean that only those units in schedule 1 can be used for trade and imperial units cannot be used.

Regarding the weighing instrument (rather than the units). The essential requirements in schedule 1F outline the units of volume that can be used for measuring instrument, and this only includes litres, so a measuring instrument cannot have a type-approval that would allow imperial units.

This is confirmed in the OIMLR117 (2.9) which has the same requirement.

There should be a mention of subsidiary indications and the requirements relating to this: (a) it is expressed in a unit of measurement other than a metric unit,

(b) it accompanies an indication of quantity expressed in a metric unit ('the metric indication') and is not itself authorised for use in the circumstances as a primary indication of quantity, and

(c) the metric indication is the more prominent, the imperial indication being expressed in characters no larger than those of the metric indication

This question is testing the candidate's knowledge of the legal tolerances that must be applied and what actions can be taken if an instrument falls outside of those tolerances. The maximum permissible error for a liquid fuel measuring instrument at 20 litres is -100ml as such it will fall outside of the mpe. This means that it could be rejected under section 72 of the Measuring Instruments Regulation's. If the inspector believes that the nature or degree of non-compliance is not such that a disqualification mark should be immediately affixed a notice requiring the person to rectify the non-compliance before the expiry of 21days or such longer period.

Q9

This question is testing whether the candidate understands the list of regulated purposes in Regulation 3 of the NAWI. An initial conformity assessment should take place when a non-automatic weighing instrument for a regulated purpose. A regulated purpose is

(a) The determination of mass for commercial transactions.

(b) the determination of mass for the calculation of a toll, tariff, tax, bonus, penalty, remuneration, indemnity or similar type of payment.

(c) the determination of mass for the application of laws or regulations or for an expert opinion given in court proceedings.

(d) the determination of mass in the practice of medicine for weighing patients for the purposes of monitoring, diagnosis and medical treatment.

(e) the determination of mass for making up medicines on prescription in a pharmacy and determination of mass in analyses carried out in medical and pharmaceutical laboratories; and

(f) the determination of price on the basis of mass for the purposes of direct sales to the public and the making up of pre-packages.

If the instrument is used for any of these purposes it must be initially conformity assessed. If the weighbridge is used for any of those purposes it will need to be conformity assessed. Although it is not used for commercial

transactions if used for any tolls or tariffs, or for declaring the weights for safety requirements (SOLAS) it will need to be initially conformity assessed.

This question is testing whether candidates understand the implications of making changes to weighing and measuring instruments and when this may constitute a new or repaired instruments. If the change that has been made to a weighing instrument is sufficiently great that it would be a new instrument it would need to be initially conformity assessed (in contrast to re-qualified) A trigger for this decision would be whether it continues to comply with the original Declaration of Conformity, the original type of examination certificate or the instrument has had any functionality added to the instrument. As the instrument has a new Indicator it will constitute a new instrument and need to be initially conformity assessed

This question is testing the understanding of the consequences of software in weighing and measuring instruments and the definition of some of the terms used. These terms can be found in the WELMEC 7 series guides. Software versioning is the process of assigning either unique version names or unique version numbers to unique states of computer software. Within a given version number category (e.g., major or minor), these numbers are generally assigned in increasing order and correspond to new developments in the software. At a fine-grained level, revision control is often used for keeping track of incrementally different versions of information, whether or not this information is computer software.

A checksum is a value that represents the number of bits in a transmission message and is used by IT professionals to detect high-level errors within data transmissions. Prior to transmission, every piece of data or file can be assigned a checksum value after running a cryptographic hash function.

The WELMEC Guide 7.2 applies to the software for used for legally controlled purposes and outlines the how software can be identified. It creates two categories of instrument type p and type u. Type p is embedded software and the software will be identified by a version number type u is universal programmable software must be identified by a checksum.

This candidate should note that this question is 15 marks, and this will warrant a lot of detail. The question should cover the following points

Should mention 8.3.1,8.3.2 and 8.3.3 of the EN45501.

8.3.1- Conformity

8.3.2 -Visual Inspection

8.3.3- Tests

Tests- Must include a list and description of all of the verification tests

- 1- Error at zero
- 2- -Linearity and hysteresis. This should include five load points and must state the errors at the load points.
- 3- Corner errors
- 4- Repeatability
- 5- Other tests including the tare if relevant.

The answer should include the refence to delta weights and the procedure for determining these.

Q10

This question is testing whether the candidate understands the different categories of automatic weighing instrument, and which one is most applicable for the weighing of refuse. This is a catch-weigher as defined under annex MI. These instruments can be subdivided into four categories Y(I) Y(II) (Y(a) and Y(b). The category Y(b) is the one that is most likely to be suitable for this application.

This question is testing whether the candidate understands the requirements in relation to the test loads necessary to conform to assess the instrument.

The OIML R51 requires that an automatic catch weigher be tested with the type of articles for which it is intended to be used. In this case it would need to be test loads that had similar characteristics as the material that was intended to be weighed. These would need to be at the minimum and maximum weight and the changeover points, and their accuracy determined on a comparison instrument controlled by the local weights and measures authority.

If the instrument has a type-examination and has been initially conformity assessed, it can be used for trade purposes. This means that it could be used to charge residents for the weight of rubbish that they collect

This question is examining whether the candidate understands the different conformity assessment modules available to manufacturers' instruments must have a type of examination certificate (module B and this must then be followed with a second module. This could be a module F (Invariably the local authority which could be the local authority if they are an approved body) or module D (self-verification). It is also possible for the instrument to be verified by module G or H1

It is important to recognise the detail required by the question is reflected on the marks allocated to the question. This question should include the following points.

These should be the tests outlined in A5 of R51

A.5 Metrological performance tests

A.5.1 General

A.5.1.1 Standard operational test for automatic operation (5.2.3.1)

The test procedure shall be as follows

- 1) Start the automatic weighing system, including (if the EUT is installed in the place of use) the surrounding equipment which is normally operational when the instrument is in use.
- 2) Set the load transport system to its maximum speed of operation (6.1.4).
- 3) Except where stated, select four test loads which must include values close to Min and Max and at values close to, but not above, two critical points (T.3.2.6) in between Min and Max (6.1.1). More than one test load may be required for each of the above load values to achieve the maximum rate of operation. Weigh the test loads on the control instrument specified in 6.1.5.1 to determine the conventional true value of each test load as specified in 6.1.6.
- 4) The number of test weighing's for each load depends on the mass of the test load as specified in 6.1.2.
- 5) Enable the test loads to be automatically weighed for the specified number of times and record each indication. Determine the individual errors of weighing in accordance with:
 - ☐ 6.1.7.1 for category X instruments.
 - ☐ 6.1.7.2 for category Y instruments.
- 6) Determine the mean error (T.4.3.5) and the standard deviation of the error (T.4.3.6) for category X instruments in accordance with 6.1.8, or the individual errors for category Y instruments