FDUS 903-1

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Double-capped fluorescent lamps — Performance specifications — Part 1: Minimum Performance Standards (MEPS)

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FDUS 903-1: 2011

Compliance with this standard does not, of itself confer immunity from legal obligations

A Uganda Standard does not purport to include all necessary provisions of a contract. Users are responsible for its correct application

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Foreword

Uganda National Bureau of Standards (UNBS) is a parastatal under the Ministry of Tourism, Trade and Industry established under Cap 327, of the Laws of Uganda. UNBS is mandated to co-ordinate the elaboration of standards and is

(a) a member of International Organisation for Standardisation (ISO) and

(b) a contact point for the WHO/FAO Codex Alimentarius Commission on Food Standards, and

(c) the National Enquiry Point on TBT/SPS Agreements of the World Trade Organisation (WTO).

The work of preparing Uganda Standards is carried out through Technical Committees. A Technical Committee is established to deliberate on standards in a given field or area and consists of representatives of consumers, traders, academicians, manufacturers, government and other stakeholders.

Draft Uganda Standards adopted by the Technical Committee are widely circulated to stakeholders and the general public for comments. The committee reviews the comments before recommending the draft standards for approval and declaration as Uganda Standards by the National Standards Council.

Committee membership

The following organizations were represented on the Energy Management Technical Committee, UNBS/TC 13, during the development of this standard:

- Department of Mechanical Engineering, Makerere University
- Econoler
- Electricity Regulatory Authority (ERA)
- GTZ-Promotion of Renewable Energy and Energy Efficiency Programme (GTZ-PREEEP)
- Ministry of Energy and Mineral Development
- Private Sector Foundation Uganda (PSFU)
- Uganda Manufacturers' Association (UMA)
- Uganda National Bureau of Standards (UNBS)
- Water and Electricity Consumers' Association (WECA)

The following organizations were represented on the Lighting Appliances Sub-committee of the Energy Management Technical Committee, UNBS/TC 13, during the development of this standard:

- Centre for Research in Energy and Energy Conservation (CREEC), Makerere University
- Department of Electrical Engineering, Makerere University
- Econoler
- Industrial Technical Solutions (ITS) (U) Ltd
- Kiboko Enterprise (U) Ltd
- Ministry of Works and Transport
- Osram/Dembe Trading Co. Ltd
- Uganda National Bureau of Standards (UNBS)

- Uganda National Chamber of Commerce and Industry (UNCCI)
- Ultra-Tec Uganda Ltd

Double-capped fluorescent lamps — Performance specifications — Part 1: Minimum Performance Standards (MEPS)

1 Scope

1.1 This Final Draft Uganda Standard specifies Minimum Energy Performance Standard (MEPS) requirements for double-capped [FD[1)] and FDH[2)]] tubular fluorescent lamps with a nominal length of 550 mm to 1500 mm and having nominal lamp wattage of 16 watts or more, that are within the scope of US IEC 60081.

This standard further specifies the following:

a) efficacy determination;

b) minimum energy performance standard requirements;

c) colour rendering index requirements; and

d) test report format.

This standard covers lamps for general illumination purposes, for use in luminaires and with lamp ballasts connected to a 240 V 50 Hz single phase or similar mains supply. Lamps that are intended for use only with high frequency (electronic) ballasts are also covered.

1.2 This standard does not apply to lamps that are clearly not intended for general illumination, specifically:

a) lamps with a dominant colour or with an output that is predominantly outside the visible spectrum;

b) lamps for colour matching and that have a colour rendering index greater than 90 and a colour appearance approximating to a point on the black body locus;

c) lamps that are specifically for use in an industrial or agricultural process;

d) lamps for medical applications; or

e) lamps that have been given written exemption by the relevant regulatory authority on the grounds that they are for a specific purpose other than general illumination and are clearly distinguishable from lamps for general illumination.

This standard does not specify electrical safety requirements.

1.3 This Standard shall be used in conjunction with US IEC 60081 and FDUS 903-2.

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1) FD is a linear double capped fluorescent lamp.

2) FDH is a double capped fluorescent lamp for high frequency ballasts only.

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.

CIE 13.3—1995, *Method of measuring and specifying colour rendering properties of light sources*

Commission of the European Communities Commission Directive 98/11/EC implementing Council Directive 92/75/EEC with regard to energy labelling of household lamps

FDUS 903-2, *Double-Capped Fluorescent Lamps — Performance Specifications — Part 2: Procedure for quantitative analysis of mercury present in fluorescent lamps*

US IEC 60081, *Double-capped fluorescent lamps — Performance specification*

3 Definitions

For the purposes of this standard, the terms and definitions given in US IEC 60081 and the following apply.

3.1
check test
full or part test in accordance with US IEC 60081 to verify the initial efficacy, maintained efficacy and/or colour rendering index of an individual model. A further test in accordance with FDUS 903-2 to verify the quantity of mercury present in each fluorescent lamp.

3.2
Colour Rendering Index (CRI)
relative measure of the shift in surface colour of an object when lit by a particular lamp, compared with how the object would appear under a reference light source. CRI is a numerical representation that rates the 'colour rendering' ability of a light source in comparison with natural daylight, which has a CRI of 100.

3.3
efficacy
ratio of lamp lumen output to the power dissipated in the lamp under the specified conditions of measurement. Symbol: F, units: lumens watts^{-1}. Efficacy is normally determined at a specified point in the lamp life (refer to 3.4 and 3.5).

3.4
initial efficacy
efficacy measured on a new lamp after 100 h of operation. Symbol: F_{100}, units: lumens watts^{-1}.

3.5
maintained efficacy
efficacy measured at 5000 h of lamp life. Symbol: F_M, units: lumens watts^{-1}. Maintained efficacy F_M shall be determined as stated in 4.2.

3.6
family of models
range of models of the one brand, for which a single set of test reports is applicable and where each of the models has the same relevant physical characteristics, efficacy, and performance characteristics (including colour rendering index). The term 'model' is synonymous with 'family of models'.

3.7
measured quantities
quantities used in this standard measured during tests carried out in accordance with US IEC 60081 and FDUS 903-2

3.8
rounding
unless otherwise stated, numbers shall be rounded and recorded to five significant figures

3.9
supplier
In Uganda 'supplier' means manufacturer or, where a completed product is manufactured for exclusive supply to a second agent, the second agent may be identified as the supplier. For products manufactured outside Uganda 'supplier' means manufacturer's local agent or importer, having an address in the country(s) where the product is sold (Uganda).

4 Performance requirements

4.1 General

All fluorescent lamps covered within the scope of Clause 1.1, shall conform to the performance criteria specified in clauses below.

4.2 Minimum Energy Performance Standard (MEPS)

Each tubular fluorescent lamp shall meet the requirements in Table 1 for initial efficacy (F_{100}), maintained efficacy (F_M) and minimum CRI.

F_M may be calculated from test data measured at more or less than 5 000 h as follows:

a) Where lumen data is not available for 5 000 h, any unadjusted single measurement at more than 5 000 h may be used to confirm the F_M requirements.

b) Where a lumen measurement is available for over 2 000 h but less than 5 000 h, F_M may be calculated as follows:

   (i) by linear extrapolation from the F_{100} value through the measured data point to 5 000 h; or

   (ii) by linear interpolation between a point in the range of 2 000 h to 5000 h and second point in the range 5 000 h to 8 000 h.

c) Where a lumen measurement is available for over 5 000 h but less than 8 000 h, F_M may be calculated by linear interpolation between a point in the range of 2 000 h to 5 000 h and second point in the range 5 000 h to 8000 h.

Table 1 — Lamp efficacy requirements

Lamp nominal length L, mm mandatory	550 ≤ L < 700	700 ≤ L < 1150	1150 ≤ L < 1350	1350 ≤ L < 1500
Lamp typical power, watts (informative)	16 - 24	17 - 40	28 - 50	35 - 80
Initial efficacy, Maintained efficacy	$F_{100} \geq 66.0$ and $F_M \geq 57.5$	$F_{100} \geq 74.0$ and $F_M \geq 61.0$	$F_{100} \geq 80.0$ and $F_M \geq 70.0$	$F_{100} \geq 85.0$ and $F_M \geq 70.0$
Minimum CRI	79	79	79	79

4.3 Test conditions for determining Minimum Energy Performance Standard of tubular fluorescent lamps

Initial lamp efficacy (lumen output and lamp power) shall be determined in accordance with US IEC 60081, except that tests on high frequency operated lamps with a nominal diameter of 16 mm (T5) may be made at an temperature of 35ºC (instead of 25 ºC).

Maintained efficacy (lumen output and lamp power) shall be determined in accordance with US IEC 60081 Colour rendering index (CRI) shall be determined in accordance with CIE 13.3—1995.

4.4 Number of tests and processing of data

For the purposes of verification of the rated values of a model at least one unit of the nominated model should be tested in accordance with the standards specified in 4.3.

More than one unit may be tested at the supplier's discretion. A test report in accordance with Annex B should be submitted for each of the MEPS requirements specified in 4.2.

NOTE Products may be registered on the basis of manufacturer's published data.

4.5 Environment criteria

4.5.1 General

This clause specifies the maximum permissible quantity of mercury in a fluorescent lamp and further specifies test procedures to determine the quantum of mercury. The requirements in Clauses 4.5.2 to 4.5.4 shall apply.

4.5.2 Permissible limit

The maximum quantity of mercury present in fluorescent lamps shall not exceed 15 mg.

4.5.3 Test procedure

The quantity of mercury present is determined in accordance with the relevant clauses of FDUS 903-2.

4.5.4 Compliance

Compliance is verified in accordance with clauses of FDUS 903-2.

5 Application and test results formats

5.1 Application for registration

5.1.1 General

Where the relevant regulatory authority requires registration or approval of Minimum Energy Performance standard requirements, clauses 5.1.2 and 5.1.3 shall apply.

5.1.2 Registration

For MEPS registration of the tubular fluorescent lamp brand and model, or type, an application in the format shown in Annex A of this standard shall be submitted.

To register, the relevant state regulatory authority should be contacted.

5.1.3 Test report

A test report summary in accordance with Annex B for each model tested should be submitted, if available, with the MEPS application.

Where a summary report in accordance with Annex B is not submitted, the source of data in the MEPS application shall be indicated in Annex A.

5.1.4 Supporting documents

All supporting documents and test reports used in the MEPS application and any summary report in Annex B shall be made available to the relevant regulatory authority upon request. These records shall be retained for at least five years after the last date of manufacture or import, whichever is applicable.

5.1.5 MEPS transition

All products within the scope of MEPS manufactured or imported for sale into Uganda on or after 1 October 2010 shall meet the MEPS requirements specified in 4.2 and such units must hold a valid registration at the time of sale which indicates compliance with the relevant MEPS requirements.

5.2 Holding of records

5.2.1 General

Where the registration or approval of MEPS is not required, 5.2.1 to 5.2.4 shall apply.

NOTE Uganda does not operate a registration process but does require submission of information for mandatory listing. Therefore suppliers should ensure that the products are registered using the form in Annex A and be submitted to the relevant authority.

5.2.2 Data

Annex A, Section 2 to Section 6 outline the information that shall be recorded and held by the lamp supplier to support the performance claims inherently made with respect to MEPS.

5.2.3 Test report

A test report summary in accordance with Annex B for each model tested should be submitted with the MEPS application. A detailed test report used in the MEPS application shall be retained by the supplier.

5.2.4 Availability

The documents required by this section shall be made available to the relevant regulatory authority upon request. Records shall be retained for at least five years after the last date of manufacture or import, whichever is applicable.

Annex A
(normative)

Application for registration of tubular fluorescent lamp for MEPS

A.1 Scope

This annex sets out the required format for submitting an application for registration and record keeping.

A.2 Application form

(Please type or print)

Section 1: Application Details		
Name of applicant: Company name: Company address:	....	
Contact person: (Details for a person in Uganda shall be provided)	Name: Address: Position/Title: Telephone: Facsimile: E-mail:	....
The Standard under which this application is made:		FDUS 903-1
What is this application for:		MEPS 2009
Is the application meant for a single model or a family of models? (identify one)		
Section 2: Description of Tubular Fluorescent Lamp		
Brand name:		
Model name (if available):		
Model number or family number:		
Other model numbers to be included under this registration:		
Country of manufacture:		
Is the product to be sold in?	Uganda Not stated	
Year and month in which model first available in Uganda:		

Does the lamp model have any markings to indicate date, serial number or batch number?	Yes No		
Does this model or family replace or supplement another model or family with identical efficacy and lumen output characteristics? (identify one)	Yes No		
If yes, indicate relevant details:	Model name:	Model number:	Registration number:
Section 3: Testing and test report			
Which of the following does the test and report rely on?	1 A test report summary submitted with a previous application 2 A summary test report in the format of Annex B that is supplied with this application 3 Published data by the manufacturer 4 Unpublished data from the manufacturer 5 Correspondence from the manufacturer 6 Other data — please specify		
	(Proceed to Section 4 if options 3, 4, 5 or 6 are selected)		
	(If option 1 is selected, note the source registration number and proceed to Section 4)		
Test laboratory type: (identify one)	Own 'in-house' or manufacturer's laboratory Independent laboratory		
Test laboratory name:			
Test laboratory address:			
Test laboratory location: (indicate correct answer)	Uganda Other- (please specify):		
Test laboratory accreditation:			
Test Standard used: (Identify one)	US IEC 60081 Other-(specify)		
Test report number(s) and date(s):			
Section 4: Specific product details			
Nominal length (mm)			
Nominal diameter (mm)			
Nominal wattage (watts)			
ILCOS code			
Lamp frequency	50 Hz High frequency		

Section 5: Test Results/Rated Values Data below is based on rated values or test results supported with a summary test report in accordance with Annex B	
Is the data below based on	rated values test results
Colour rendering index (CRI) [According to CIE 13.3-1995]	
Initial lumens (L)	
Initial lamp watts (W)	
Initial efficacy, F_{100} (lumens/watt)	
Maintained lumens (L)	
Maintained lamp watts (W)	
Maintained efficacy, F_M (lumens/watt)	
Section 6 Minimum Energy Performance Standards (minimum efficiency) MEPS are mandatory for all tubular fluorescent lamps that are covered within the scope of this Standard (see Clause 1.1). Detailed MEPS requirements are set out in Clause 4.	
Lamp nominal length (mm) :	----------
Applicable MEPS levels Initial efficacy (lumens/watt): ……..[lumens/watt] (see Table 1) Maintained efficacy (lumens/watt): ……..[lumens/watt] (see Table 1)	
Rated/Tested levels Initial efficacy (lumens/watt): ……..[lumens/watt] (see Table) Maintained efficacy (lumens/watt): ……..[lumens/watt] (see Table)	
Performance prerequisite declaration Does this model comply with MEPS? Yes (Identify one) No	
Section 7: Mercury Content	
Mercury present in fluorescent lamps determined in accordance with FDUS 903-2	Does not exceed 15 mg Exceeds 15 mg
If exceeding 15 mg; specify quantity:	----------mg
Section 8: Declaration	
I declare that the details stated above are true and correct in accordance with the requirements of US IEC 60081 Signature of Applicant: ..... Date:	
Office use only Date received: Registration number:	

Annex B
(informative)

Summary test report for a tubular fluorescent lamp for MEPS

This annex sets out the preferred format for a test report where the lamp is tested to US IEC 60081.

Test Report of a Tubular Fluorescent Lamp for Energy Efficiency

(Please type or print)

DESCRIPTION OF TUBULAR FLUORESCENT LAMP	
Brand name:	
Model name or family name (if available):	
Model number or family number:	
Batch number:	
Nominal length (mm)	
Nominal diameter (mm)	
Nominal wattage (watts)	
ILCOS code	
Country of manufacture:	
LABORATORY DETAILS	
Test laboratory type: (identify one)	Own 'in-house' laboratory Independent laboratory
Test laboratory name:	
Test laboratory location: (Identify one)	
Test laboratory address:	
Test laboratory accreditation:	
NOTE Laboratory details for each test to be included, where more than one laboratory has been used.	
TEST RESULTS Tests should be undertaken in accordance with US IEC 60081. Photometric characteristics should be measured in accordance with the relevant recommendation of the CIE (Commission Internationale de l'Eclairage)	
Initial lumens test	
Test report number:	
Test laboratory name:	
Date of test:	
Lamp batch tested:	
Test standard used	US IEC 60081 Other-specify
Reference ballast brand and model:	
Ballast supply voltage (V):	
Ballast supply frequency (Hz):	

Highest recorded ambient temperature (°C):	
Lowest recorded ambient temperature (°C):	
Lamp supply voltage (V):	
Lamp current (A):	
Lamp input power (W):	
Initial luminous flux (lumens) (L):	
Initial efficacy F100 (calculated) (100 hours):	
Initial efficacy (calculated) (100 hours)	
Maintained lumens test	
Test report number:	
Test laboratory name:	
Date of test:	
Lamp batch tested:	
Test Standard used	US IEC 60081 Other-specify
Reference ballast brand and model:	
Ballast supply voltage (V):	
Ballast supply frequency (Hz):	
Highest recorded ambient temperature (°C):	
Lowest recorded ambient temperature (°C):	
Lamp supply voltage (V):	
Lamp current (A):	
Lamp input power (W):	
Maintained luminous flux (lumens) (L):	
Maintained efficacy FM (calculated) (5000 hours):	
Colour rendering index (CRI)	
Test report number:	
Test laboratory name:	
Date of test:	
Lamp batch tested:	
Test Standard used:	CIE 13.3—1995 Other (specify)
Reference ballast brand and model:	
Ballast supply voltage (V):	
Ballast supply frequency (Hz):	
Colour Rendering Index	
Mercury present in fluorescent lamp:	_____ mg
determined in accordance with:	FDUS 903-2, other-specify

Annex C
(informative)

Energy efficiency class

The energy efficiency class of a lamp shall be determined as follows:

Lamps shall be classified in class A if:

a) Fluorescent lamps without integral ballast (those requiring a ballast and/or other control gear to connect them to the mains)

$W \leq 0.15\ \Phi + 0.0097\Phi$

b) Other lamps

$W \leq 0.24\ \Phi + 0.0103\Phi$

where

Φ is the lumen output of the lamp

where

W is the power input into the lamp in watts.

If a lamp is not classified in class A, reference wattage W_R shall be calculated as follows:

$W_R \leq 0.88\ \Phi + 0.049\Phi$

when $\Phi > 34$ lumens

where

Φ is the lumen output of the lamp.

An energy efficiency index EI is then set as—

$$E_I = \frac{W}{W_R}$$

where

W is the power input into the lamp in watts.

The energy efficiency classes are then set in accordance with Table C1.

Table C1: Energy Efficiency

Energy efficiency class	Energy efficiency Index E_I
B	$E_I < 60\%$
C	$60\ \% \leq E_I < 80\ \%$
D	$80\ \% \leq E_I < 95\ \%$
E	$95\ \% \leq E_I < 110\ \%$
F	$110\ \% \leq E_I < 130\ \%$
G	$E_I \geq 130\%$

Bibliography

[1] US IEC 60081: Double-capped fluorescent lamps Performance specifications

[2] FDUS 903-2: Procedure for quantitative analysis of mercury present in fluorescent lamps

Certification marking

Products that conform to Uganda standards may be marked with Uganda National Bureau of Standards (UNBS) Certification Mark shown in the figure below.

The use of the UNBS Certification Mark is governed by the Standards Act, and the Regulations made thereunder. This mark can be used only by those licensed under the certification mark scheme operated by the Uganda National Bureau of Standards and in conjunction with the relevant Uganda Standard. The presence of this mark on a product or in relation to a product is an assurance that the goods comply with the requirements of that standard under a system of supervision, control and testing in accordance with the certification mark scheme of the Uganda National Bureau of Standards. UNBS marked products are continually checked by UNBS for conformity to that standard.

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