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Clean cookstoves and clean cooking solutions — Vocabulary

Fourneaux et foyers de cuisson propres — Vocabulaire

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Foreword

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 285, *Clean cookstoves and clean cooking solutions*.

Introduction

The purpose of this document is to establish a precise vocabulary for cookstove technology and testing. To establish commonalities among cooking systems with differing boundaries, this document repeats definitions found in other products of ISO/TC 285.

Confirming acceptable cookstove performance in any particular aspect requires not only a vocabulary definition of that aspect, but also specific measurement techniques and methods for determining a performance indicator, as well as social agreements on the quantitative values of such indicators that correspond to suitable performance; these concerns are addressed in other documents of ISO/TC 285.

Clean cookstoves and clean cooking solutions — Vocabulary

1 Scope

This document defines terms for use in documents prepared by ISO/TC 285. Basic schematic illustrations are also provided to demonstrate relationships among certain concepts defined herein.

This document deliberately excludes some information that could be useful in the practice of testing and evaluation. Designation of specific products, even as examples, is avoided so that the document stays up-to-date and inclusive.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1 Appliances

3.1.1
batch-loaded cookstove
cookstove (3.1.7) into which fuel is infrequently loaded during operation

3.1.2
built in-place cookstove
cookstove (3.1.7) in which the majority of assembly and/or construction takes place where it will be used

3.1.3
candidate cookstove
cookstove (3.1.7) being considered by a *target community* (3.6.16)

3.1.4
clean cookstove
cookstove (3.1.7) that reduces emissions to an acceptable level when fed with a defined fuel or fuels

Note 1 to entry: The determination of an acceptable level of emissions depends on programmatic goals, and includes consideration of health and *environmental impacts* (3.6.7) and best available technology.

3.1.5
continuously fed cookstove
cookstove (3.1.7) in which fuel is constantly or frequently fed during operation

3.1.6
cooking vessel
pot or container in which food or water is heated and prepared

3.1.7
cookstove
appliance primarily employed for the cooking of food, but which can also be employed for space or water heating, or other purposes

3.1.8
griddle cookstove
comal cookstove
plancha cookstove
cookstove (3.1.7) in which the majority of cooking occurs by placing the food directly on a heated surface, usually a metal or ceramic plate

Note 1 to entry: The griddle cookstove has regional names such as "plancha cookstove", "comal cookstove" and "mittad".

3.1.9
improved cookstove
cookstove (3.1.7) proposed for a geographic region or *target community* (3.6.16), which has been shown to outperform a *baseline* (3.3.1) with respect to primary criteria that can include *emission factors* (3.3.9), *energy efficiency* (3.3.11), *durability* (3.3.8) and/or *safety* (3.3.22)

3.1.10
pot skirt
device that encircles a *cooking vessel* (3.1.6) for the purpose of increasing heat transfer to the vessel

Note 1 to entry: The pot skirt can be part of cookstove design, part of the pot design or an accessory.

3.1.11
retained heat cooker
insulated container that can accommodate one or more *cooking vessels* (3.1.6) that have been previously heated on a *cookstove* (3.1.7)

3.1.12
traditional cookstove
type of *cookstove* (3.1.7) or three-stone open fire that has been in long existence in a region and has been established from generation to generation

3.1.13
water heating cookstove
cookstove (3.1.7) designed to transfer heat to water for space heating and other purposes

3.2 Fuel

3.2.1
as fired
condition of a fuel immediately before testing in a *cookstove* (3.1.7)

3.2.2
as received
condition of a fuel as it is received for testing in a *cookstove* (3.1.7)

3.2.3
ash
residue remaining after combustion of a fuel under specified analytical conditions, typically expressed as a percentage of the mass of dry matter in fuel

3.2.4
ash solids
portion of the *remaining solids* (3.2.23) that has negligible recoverable *heating value* (3.2.16)

3.2.5
biofuel
material of biological origin used as fuel, including, but not limited to, wood, agricultural residues, dung, biogas and processed lignocelluloses

EXAMPLE Charcoal, briquettes, pellets.

3.2.6
burn sequence
combustion of fuel in a *cookstove* (3.1.7) from *ignition* (3.2.18) to an end point defined in a specific protocol

3.2.7
char
carbonaceous residue resulting from pyrolysis or incomplete combustion

Note 1 to entry: The composition of *residual fuel* (3.2.24) is largely char, see Clause 4.

3.2.8
combustible mass
portion of the fuel consisting of fixed carbon and volatile components, excluding *ash* (3.2.3) and moisture, which can potentially be combusted

3.2.9
conventional fuel
fuel or fuels regularly employed by the *target community* (3.6.16)

3.2.10
dry fuel
fuel from which all moisture has been removed by heating to 3 °C above the local boiling point

3.2.11
dry basis
basis for calculation of sample quality characteristics, in which the mass of the sample without water content is used

Note 1 to entry: The dry basis is expressed in per cent.

3.2.12
exhaust
gases and suspended *particulate matter* (3.4.7) resulting from the combustion process

3.2.13
fly ash
ash (3.2.3) that is entrained in the *exhaust* (3.2.12)

3.2.14
fossil fuel
carbonaceous material derived from geological deposits, including coal, peat, natural gas and liquid fuels

3.2.15
fugitive emissions
emissions that come from a cookstove into the cooking environment as opposed to those removed from the cookstove via a chimney

3.2.16
heating value
calorific value
energy per unit mass released in the complete combustion of a sample of fuel, $MJ.kg^{-1}$

Note 1 to entry: When determining heating value, the state of the fuel, as defined by the *as fired* (3.2.1), *as received* (3.2.2) or *dry fuel* (3.2.10) conditions shall be recorded, and the heating value shall be stated as either *higher heating value* (3.2.17) or *lower heating value* (3.2.20).

3.2.17
higher heating value
measured value of the energy of combustion of a fuel burned in oxygen in a bomb calorimeter under such conditions that all the water of the reaction products is in the form of liquid water at 15 °C, $MJ.kg^{-1}$

3.2.18
ignition
start of a period of combustion

3.2.19
kindling
readily ignitable material used for starting a fire

3.2.20
lower heating value
calculated value of the energy of combustion of a fuel burned in oxygen in a combustion bomb under such conditions that all the water of the reaction products remain as water vapour at 150 °C, $MJ{\cdot}kg^{-1}$

Note 1 to entry: The *heating value* (3.2.16) at constant pressure is generally used.

3.2.21
raw fuel
mass of the unburned fuel supplied to a *cookstove* (3.1.7) during the course of the *burn sequence* (3.2.6)

Note 1 to entry: Raw fuel is expressed in kilograms.

3.2.22
recovered fuel
material that has a usable energy content that remains after a *burn sequence* (3.2.6) is completed

3.2.23
remaining solids
solids, excluding *fly ash* (3.2.13), remaining at the completion of a *burn sequence* (3.2.6)

Note 1 to entry: Remaining solids are a mixture of *ash solids* (3.2.4) and *recovered fuel* (3.2.22), see Clause 4.

3.2.24
residual fuel
portion of the *recovered fuel* (3.2.22) that is not *reused fuel* (3.2.25)

3.2.25
reused fuel
material separated from the *recovered fuel* (3.2.22) that has properties such that it can be employed in a subsequent *burn sequence* (3.2.6) in the same *cookstove* (3.1.7)

Note 1 to entry: Reused fuel comprises primarily partially burned fuel and can include some *char* (3.2.7), see Clause 4.

3.2.26
reused fuel in
reused fuel (3.2.25) from a prior *burn sequence* (3.2.6) that is added to the *raw fuel* (3.2.21) to make up the *total fuel* (3.2.27)

3.2.27
total fuel
sum of the masses of the *raw fuel* (3.2.21) and the *reused fuel in* (3.2.26)

3.2.28
wet basis
basis for describing the composition of a fuel sample as the ratio of the mass of a component to the mass of the fuel in its *as received* (3.2.2) or *as fired* (3.2.1) state

Note 1 to entry: The wet basis is expressed in per cent.

3.3 Metrics

3.3.1
baseline
status of a market, community or *cooking system* (3.5.4) prior to intervention, determined by measurements and metadata

3.3.2
burn rate
rate at which test fuel is consumed in a *cookstove* (3.1.7)

Note 1 to entry: The burn rate is expressed in kg [*dry basis* (3.2.11)] per hour.

3.3.3
char energy productivity
ratio of the energy of usable *char* (3.2.7) produced to the *fuel energy in* (3.3.14)

Note 1 to entry: When determining char energy productivity, the protocol should clearly specify the methodology for determining the usable char.

3.3.4
char mass productivity
ratio of the mass of usable *char* (3.2.7) produced to the mass of dry *raw fuel* (3.2.21)

Note 1 to entry: When determining char mass productivity, the protocol should clearly specify the methodology for determining the usable char.

3.3.5
cooking efficiency
energy efficiency (3.3.12) for *cookstoves* (3.1.7) used only for cooking

Note 1 to entry: Energy efficiency for *space heating* (3.5.12) can differ from cooking efficiency for cookstoves.

3.3.6
cooking power
rate of energy delivered to the contents of a *cooking vessel* (3.1.6) over any chosen period during the course of a *cooking sequence* (3.5.3) or other task

Note 1 to entry: The cooking power is expressed in kilowatts.

3.3.7
cooking time
elapsed time from the time when the food is placed on the *cookstove* (3.1.7) to the time when the food is removed from the cookstove

Note 1 to entry: If multiple cookstoves are used, the cooking time shall be taken from the first placement to the final removal.

Note 2 to entry: The cooking time is expressed in seconds.

3.3.8
durability
ability of a *cookstove* (3.1.7) to continue to be operated for an extended period safely (see 3.3.21) and with minimal loss of performance under conditions typical of those found in the *target community* (3.6.16)

3.3.9
emission factor
ratio of the mass of a pollutant emitted to a defined measure that quantifies the activity emitting the pollutant

Note 1 to entry: Examples of these defined measures are the *useful energy delivered* (3.3.26), the mass of the dry *raw fuel* (3.2.21) or the *fuel energy in* (3.3.14).

3.3.10
emission rate
mass of an air pollutant emitted per unit time

Note 1 to entry: The emission rate is expressed in grams per second.

3.3.11
energy efficiency
ratio of the *useful energy delivered* (3.3.26) to the *fuel energy in* (3.3.14)

Note 1 to entry: This metric is not appropriate by itself for calculating fuel savings when a *cookstove* (3.1.7) produces *char* (3.2.7) that is conserved for use as fuel.

Note 2 to entry: When determining energy efficiency, the use of either *lower heating value* (3.2.20) or *higher heating value* (3.2.17) shall be recorded and should be specified by the protocol. It is essential to record this selection because it affects the calculation of efficiency.

Note 3 to entry: The *firepower* (3.3.13) at which the efficiency is determined should be clearly specified.

3.3.12
exergy efficiency
ratio of the *useful energy delivered* (3.3.26) to the *fuel energy used* (3.3.15)

3.3.13
firepower
rate of energy release from the combustion of the fuel over a specified period in the *burn sequence* (3.2.6)

Note 1 to entry: When determining firepower, protocol should identify calculations performed, either with the assumption of complete combustion or with formulae accounting for incomplete combustion.

Note 2 to entry: Firepower is expressed in kilowatts.

3.3.14
fuel energy in
product of the *heating value* (3.2.16) of the *raw fuel* (3.2.21) and the mass of the raw fuel *as fired* (3.2.1)

Note 1 to entry: When calculating fuel energy in, heating value shall be defined as either *lower heating value* (3.2.20) or *higher heating value* (3.2.17).

Note 2 to entry: Means for including the *kindling* (3.2.19) in the fuel energy in should be specified by protocol.

Note 3 to entry: Fuel energy in is expressed in kilojoules.

3.3.15
fuel energy used
fuel energy in (3.3.14) less the product of the *heating value* (3.2.16) of the *residual fuel* (3.2.24) and its mass

Note 1 to entry: Fuel energy used is expressed in kilojoules.

3.3.16
heat flux
density of heat flow
useful energy delivered (3.3.26) divided by a specified area of the *cooking vessel* (3.1.6) and by the time during which it is delivered

Note 1 to entry: Heat flux is expressed in kilowatts per square metre.

3.3.17
lost heat
fuel energy in (3.3.14) less the sum of the *useful energy delivered* (3.3.26) and the *residual fuel energy* (3.3.20)

Note 1 to entry: Lost heat is expressed in kilojoules.

3.3.18
maximum cooking power
highest *cooking power* (3.3.6) for which a *cookstove* (3.1.7) is designed or can be operated safely

Note 1 to entry: The maximum cooking power is expressed in kilowatts.

3.3.19
minimum cooking power
lowest *cooking power* (3.3.6) for which a *cookstove* (3.1.7) is designed

Note 1 to entry: The minimum cooking power is expressed in kilojoules.

3.3.20
residual fuel energy
product of the *heating value* (3.2.16) of the *residual fuel* (3.2.24) and its mass

Note 1 to entry: When determining residual fuel energy, the heating value shall be defined as either *lower heating value* (3.2.20) or *higher heating value* (3.2.17), consistent with the heating value as defined in *fuel energy in* (3.3.14).

Note 2 to entry: The residual fuel energy is expressed in kilojoules.

3.3.21
safe
having the capacity to be used at an acceptable level of risk of harm

3.3.22
safety
ability of a *cookstove* (3.1.7) to be operated at an acceptable level of risk of harm

3.3.23
simmering
condition achieved during some *cooking sequences* (3.5.3) when the energy input to the *cooking vessel* (3.1.6) closely balances the heat loss from the cooking vessel and its contents in order to maintain the contents at a temperature near the local boiling point

3.3.24
time use
time, including perceived and actual, spent on a defined task, such as fuel collection and preparation, food preparation and cooking, or cleaning and maintenance, including among household members

Note 1 to entry: to entry. Time use is expressed in units of s.

3.3.25
turn down ratio
ratio of the *maximum cooking power* (3.3.18) to the *minimum cooking power* (3.3.19)

3.3.26
useful energy delivered
energy that provides the services desired by the *cookstove* (3.1.7) user, especially for heating the contents of a *cooking vessel* (3.1.6)

Note 1 to entry: When cookstoves are used for both cooking and *space heating* (3.5.12), the useful energy delivered can include heat delivered to a living space.

Note 2 to entry: The determination of the useful energy delivered depends on the cooking practice and the purpose of the relevant performance metric. Depending on these factors, the useful energy delivered may include all or a fraction of the energy transferred to the cooking vessel.

Note 3 to entry: Energy transferred to the contents of a cooking vessel includes the energy that raises the temperature of the contents and the latent heat of evaporation of water from the vessel.

Note 4 to entry: The useful energy delivered is expressed in kilojoules.

3.4 Pollutants

3.4.1
black carbon
particulate carbonaceous material less than 2,5 µm in diameter, containing mostly carbon by mass and measured by its high absorption of visible light

3.4.2
carbon monoxide
toxic gas formed during the incomplete combustion of carbonaceous material

3.4.3
elemental carbon
particulate carbonaceous material emitted during combustion that demonstrates a refractory nature according to a defined thermal-optical protocol

3.4.4
exposure
contact of an organism with a chemical, physical or biological agent at levels above those normally found in the organism's environment

3.4.5
household air pollution
presence of trace substances in the atmosphere of living spaces that are not a part of the normal composition of clean air

3.4.6
organic carbon
carbonaceous material emitted during combustion in which the carbon is chemically bonded to hydrogen and possibly also to oxygen, nitrogen, sulphur or other elements

3.4.7
particulate matter
solids and liquids of a sufficiently small size to be suspended in air

3.4.8
$PM_{2,5}$
fine *particulate matter* (3.4.7) such that the aerodynamic equivalent diameter of the particles is less than or equal to 2,5 µm

3.4.9
PM_{10}
particulate matter (3.4.7) such that the aerodynamic equivalent diameter of the particles is less than or equal to 10 µm

3.5 Testing

3.5.1
calibration
comparison and adjustment to a standard of known accuracy

3.5.2
composite test sequence
test sequence that covers a range of behaviours

3.5.3
cooking sequence
operation of a *cookstove* (3.1.7) that uses the heat released during a *burn sequence* (3.2.6) for the preparation of food or the heating of water, with a recorded or prescribed series of power level settings, durations and *cooking vessel* (3.1.6) utilisations

Note 1 to entry: The cooking sequence commences with the placement of the first cooking vessel on the cookstove and ends when the last vessel is removed. The entire cooking sequence is normally embedded within a burn sequence, though in special cases *retained heat cookers* (3.1.11) might continue cooking after the fire has been extinguished or while additional cooking tasks are undertaken.

3.5.4
cooking system
combination of *cookstove* (3.1.7), fuel, cooking equipment, cooking environment (including ventilation) and cooking practice

3.5.5
dilution system
apparatus that mixes a sample stream with air, nitrogen or other gases of known composition in a controllable ratio

3.5.6
dilution tunnel
device in which ambient or cleaned air is mixed with an emission stream at a controlled and measured volumetric flow rate

3.5.7
field testing
observation or measurement of any part or parts of a *cooking system* (3.5.4) conducted under various actual use conditions, instead of under controlled conditions in a laboratory

3.5.8
gravimetric method
quantification of a sample of *particulate matter* (3.4.7) through the direct measurement of mass

3.5.9
laboratory testing
measurement of product performance quantified under controlled and documented conditions, where performance can be replicated by duplicating those conditions

3.5.10
pot swapping
testing method whereby water is heated in a series of *cooking vessels* (3.1.6) that are replaced successively as the contents reach a specified temperature

3.5.11
procedure
systematic method specified for accomplishing certain tasks related to the testing or assessment of *cookstoves* (3.1.7)

3.5.12
space heating
delivery of useful heat from a heat source into a surrounding or adjacent living space

3.5.13
stove stacking
practice of a household using more than one *cookstove* (3.1.7)

3.5.14
water heating test
test of a *cookstove* (3.1.7) or *water heating cookstove* (3.1.13) that uses one or more *cooking vessels* (3.1.6) or heat exchangers containing water that are heated to a specified temperature less than the local boiling point during a defined set of *burn sequences* (3.2.6)

3.6 Social measures

3.6.1
adoption
condition in which a user employs an *improved cookstove* (3.1.9) regularly and maintains it

Note 1 to entry: Use of the term "adoption" should be accompanied by protocols defining the duration over which the improved cookstove should be employed and maintained to achieve adoption.

3.6.2
agency
ability to define one's goals and act upon them

3.6.3
economic impact
net change, either positive or negative, in an economic activity, including industrial output, value added, wealth, personal income, jobs and resources

3.6.4
employment
occupation for which people are paid either in cash or in kind

3.6.5
empowerment
process of the expansion of people's ability to make strategic life choices in a context where this ability was previously denied to them

3.6.6
entrepreneur
one who seeks to generate value through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets

3.6.7
environmental impact
positive, neutral or negative effect on the social or material environment in a given area resulting from a change

3.6.8
food security
condition when all people, at all times, have physical and economic access to sufficient, *safe* (3.3.21) and nutritious food that meets their dietary needs and food preferences

3.6.9
gender
culturally and socially constructed roles and responsibilities of different sexes that exist in families, societies and cultures, and the power relations that exist between different sexes

3.6.10
gender impact
results that differ according to the sex of the participant/recipient or that affect *gender* (3.6.9) relationships and perceptions

3.6.11
livelihood
capabilities, assets, income and activities required to obtain the necessities of life

3.6.12
quality of life
individuals' objective and perceived position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns, and the sum of the above as expressed in their community

3.6.13
social impact
positive and negative consequences of any actions to improve cooking that can alter or affect the ways in which people live

3.6.14
stakeholders
those involved in the development of *clean cookstoves* (3.1.4)

3.6.15
sustained adoption
state in which there has been *adoption* (3.6.1) for an extended period of time

3.6.16
target community
social group that regularly employs *cookstoves* (3.1.7) and has expressed a willingness to consider the introduction of *improved cookstoves* (3.1.9)

3.6.17
well-being
individual's sense of his or her *quality of life* (3.6.12)

4 Schematic illustrations

Figures 1 and 2 illustrate the relationships among selected concepts defined in Clause 3.

Definitions for terms in Figure 1 are numbered within Clause 3 as follows:

— ash solids (3.2.4);

— cookstove (3.1.7);

— exhaust (3.2.12);

— fly ash (3.2.13);

— raw fuel (3.2.21);

— recovered fuel (3.2.22);

— remaining solids (3.2.23);

— residual fuel (3.2.24);

— reused fuel (3.2.25);

— reused fuel in (3.2.26);