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Utility lighters — General consumer-safety requirements

Briquets utilitaires — Exigences générales de sécurité

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 22702 was prepared by Technical Committee ISO/TC 61, *Plastics*.

Introduction

This consumer-safety specification covers all flame-producing consumer products commonly known as utility lighters (also known as grill lighters, fireplace lighters, lighting rods or gas matches), and similar devices. This specification establishes requirements for utility lighters to ensure a reasonable degree of safety for normal use or reasonably foreseeable misuse of such lighters by users.

Utility lighters, being flame-producing devices, can, as do all flame sources, present a potential hazard to the user. This specification cannot eliminate all hazards, but is intended to minimize potential hazards of utility lighters to users.

Utility lighters — General consumer-safety requirements

WARNING — This International Standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

1 Scope

This consumer-safety specification covers all flame-producing consumer products commonly known as utility lighters (also known as grill lighters, fireplace lighters, lighting rods or gas matches), and similar devices, as defined in 2.6. Matches are specifically excluded from this safety specification; flame-producing products intended for igniting cigars, pipes and cigarettes are also specifically excluded from this safety specification.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
valve
component of a utility lighter that controls the input or release of fuel

2.2
nozzle
end of the fuel discharge system

2.3
flame height
linear distance from the tip of the visible flame to the end of the shield

2.4
flaring
variation of flame height from the steady-state flame condition

2.5
ignite
to produce a flame with a utility lighter by activating the self-contained ignition and fuel release systems of that utility lighter in the intended manner

2.6
utility lighter
hand-held, flame-producing device with a manually-operated ignition system, 100 mm or greater in length when in the fully extended position, employing a fuel as defined in 2.9, used primarily to ignite items such as candles, fuel for fireplaces, charcoal- or gas-fired grills, camp stoves, lanterns, fuel-fired appliances or devices and/or pilot lights

2.7
utility lighter, adjustable
utility lighter that is received by the consumer with a mechanism for the user to manually vary the height of the flame

2.8
utility lighter, disposable
utility lighter that is received by the user with a supply of fuel and that is not intended to be refuelled

2.9
fuel
butane, isobutane, propane or other liquefied hydrocarbon, or a mixture containing any of these, whose vapour pressure at 24 °C exceeds a gauge pressure of 103 kPa

2.10
utility lighter, non-adjustable
utility lighter that has a flame height preset by the manufacturer and is not provided with a mechanism to adjust the flame height

2.11
utility lighter, refillable
utility lighter that is intended to be refuelled either by transferring fuel from an external container or by inserting a new prepackaged fuel reservoir

2.12
utility lighter, self-extinguishing
utility lighter that, once ignited, requires continuous intentional and positive action to maintain a flame and that is subsequently extinguished upon the termination of such positive action

2.13
utility lighter, non-self-extinguishing
utility lighter that, once ignited, does not require intentional or positive action by the user to maintain a flame and requires a subsequent, deliberate user action to extinguish the flame

2.14
shield
structure that totally or partially surrounds the nozzle of the utility lighter

2.15
sustained self-ignition
propagation of a flame by other than deliberate manual operation, such as by dropping the utility lighter, so as to cause the ignition system to be activated and the flame to continue to burn

2.16
spitting
sputtering
flame phenomenon of a utility lighter wherein the escape of non-evaporated or liquid fuel produces a shower of burning liquid droplets which separate from the main flame

2.17
fuel reservoir
structure that stores the fuel prior to release

2.18
ignition system
system that generates a spark to ignite the fuel, such as a piezo mechanism or battery

2.19
premixing burner utility lighter
gas utility lighter in which fuel and air are mixed before being supplied for combustion

2.20
postmixing burner utility lighter
gas utility lighter in which fuel is supplied for combustion and air is supplied at the point of combustion

2.21
flame
the result of combustion of fuel that produces heat and often light which could be visible to the naked eye under normal or subdued lighting conditions

3 Functional requirements

3.1 Flame generation

In order to minimize the possibility of inadvertent or self-ignition, utility lighters shall require a deliberate manual operation to produce a flame. These operations shall conform to at least one of the following requirements:

a) a system such that positive action on the part of the user is required to generate and maintain a flame;

b) a system that requires two or more independent actions by the user to generate a flame;

c) a system that requires an actuating force equal to or greater than 15 N to generate a flame (see Figure 1 for an example of test equipment).

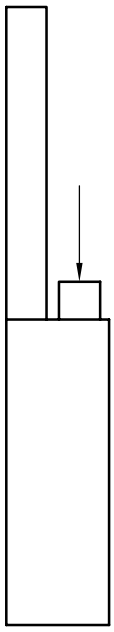

Figure 1 — Block diagram showing a typical example of test equipment for measuring the flame generatation actuating force as specified in 3.1 c)

3.2 Flame heights

3.2.1 General

The maximum attainable flame height for utility lighters shall be limited with a setting or by product design, or both. For adjustable-flame-height utility lighters, the maximum flame height that a user will obtain on first activating the utility lighter without adjustment shall also be limited. These limits shall comply with the following requirements when tested in accordance with 7.1.

3.2.2 Non-adjustable postmixing burner utility lighters

Non-adjustable postmixing burner utility lighters, as defined in 2.10 and 2.20, shall have, in the user's hands, a maximum attainable flame height of no more than 100 mm when the flame is directed vertically upward when tested in accordance with 7.1. See Annex A.1 for mandatory AQLs and the Bibliography for sampling scheme references.

3.2.3 Non-adjustable premixing burner utility lighters

Non-adjustable premixing burner utility lighters, as defined in 2.10 and 2.19, shall have, in the user's hands, a maximum attainable flame height of no more than 75 mm when the flame is directed vertically upward when tested in accordance with 7.1. See Annex A.1 for AQLs and the Bibliography for sampling scheme references.

3.2.4 Adjustable-flame-height postmixing burner utility lighters

Adjustable-flame-height postmixing burner utility lighters, as defined in 2.7 and 2.20, shall not be capable of producing a flame height greater than 150 mm when the flame is directed vertically upward when deliberately adjusted by the user to the manufacturer's design limit for maximum flame height and when tested in accordance with 7.1. See Annex A.1 for AQLs and the Bibliography for sampling scheme references.

3.2.5 Adjustable-flame-height premixing burner utility lighters

Adjustable-flame-height premixing burner utility lighters, as defined in 2.7 and 2.19, shall not be capable of producing a flame height greater than 75 mm when the flame is directed vertically upward when deliberately adjusted by the user to the manufacturer's design limit for maximum flame height and when tested in accordance with 7.1. See Annex A.1 for AQLs and the Bibliography for sampling scheme references.

3.2.6 Adjustable-flame-height postmixing burner utility lighters (flame height on first ignition)

Adjustable-flame-height postmixing burner utility lighters, as defined in 2.7 and 2.20, shall have the flame height adjusted by the manufacturer in such a manner that the utility lighter, when first ignited by the user without changing the adjustment, will not produce a flame height in excess of 100 mm when the flame is directed vertically upward and when tested in accordance with 7.1. See Annex A.1 for AQLs and the Bibliography for sampling scheme references.

3.2.7 Adjustable-flame-height premixing burner utility lighters (flame height on first ignition)

Adjustable-flame-height premixing burner utility lighters, as defined in 2.7 and 2.19, shall have the flame height adjusted by the manufacturer in such a manner that the utility lighter, when first ignited by the user without changing the adjustment, will not produce a flame height in excess of 60 mm when the flame is directed vertically upward and when tested in accordance with 7.1. See Annex A.1 for AQLs and the Bibliography for sampling scheme references.

3.2.8 Adjustable-flame-height postmixing burner utility lighters (flame height at lowest setting)

Adjustable-flame-height postmixing burner utility lighters, as defined in 2.7 and 2.20, shall be capable of producing a flame not in excess of 75 mm with the flame directed vertically upward, when set at the lowest possible flame height and tested in accordance with 7.1.

3.2.9 Adjustable-flame-height premixing burner utility lighters (flame height at lowest setting)

Adjustable-flame-height premixing burner utility lighters, as defined in 2.7 and 2.19, shall be capable of producing a flame not in excess of 50 mm with the flame directed vertically upward, when set at the lowest possible flame height and tested in accordance with 7.1.

3.3 Flame-height adjustment

3.3.1 Adjustable-flame-height utility lighters, as defined in 2.7, shall require a deliberate action on the part of the user either to decrease or to increase the flame height when the utility lighter is used in the normal fashion.

3.3.2 If flame-height adjustment features protrude from the body of the utility lighter, it shall require a minimum actuating force of 1 N applied over the entire range of adjustment in a tangential direction (see Figure 2 for an example of test equipment).

3.3.3 Adjustable utility lighters having rotary movement flame-height adjustment features approximately at right angles to the flame shall perform as follows:

a) When the flame-height adjustment feature of the utility lighter is held so the flame is oriented vertically upward, and the user is facing the flame-height adjustment feature, moving the actuator to the left shall produce a decrease in flame height.

b) Adjustable utility lighters requiring motion of the flame-height adjustment feature approximately parallel to the flame axis shall decrease or increase the flame height according to the direction of the movement.

c) When the flame control actuator is at the bottom of the lighter, and the lighter is held so that the user is facing the actuator, a clockwise movement shall produce a decrease in flame height.

Adjustable-flame-height utility lighters shall indicate the direction of movement to produce a higher or lower flame height. On utility lighters, the direction of movement shall be permanently imprinted or engraved on the utility lighter. Such information shall be placed on the utility lighter in the vicinity of the flame-height adjustment feature and be readily visible and understandable.

3.4 Resistance to spitting or sputtering and flaring

Utility lighters, as defined in 2.6, when set at the maximum flame height, shall exhibit no spitting or sputtering as defined in 2.16 or flaring as defined in 2.4, when tested in accordance with 7.2.

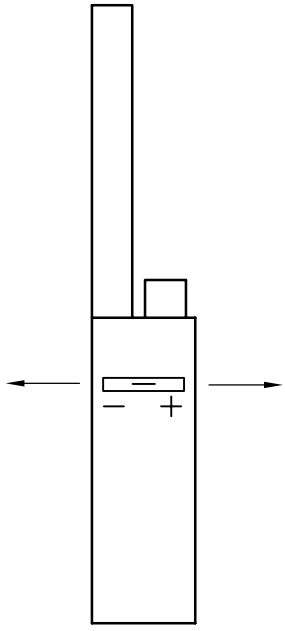

Figure 2 — Block diagram showing a typical example of test equipment for measuring the flame-height adjustment feature actuating force as specified in 3.3.2

3.5 Flame extinction

3.5.1 Adjustable postmixing burner utility lighters

Adjustable postmixing burner utility lighters, after a 10 s burn at maximum flame height, when extinguished in the intended manner, such as by releasing a button or lever, shall have any exposed flame completely extinguished within 3 s after such action is completed, when tested in accordance with 7.3. In the case of postmixing burner utility lighters that have shields, an additional 3 s afterburn is acceptable if the flame height during this additional 3 s period does not extend above the shield.

3.5.2 Adjustable and non-adjustable postmixing burner utility lighters

Adjustable postmixing burner utility lighters when set at a flame height of 100 mm (or the maximum height the adjustment allows if lower than 100 mm), or non-adjustable postmixing burner utility lighters at their permanently set flame heights, after a 20 s burn, when extinguished in the intended manner, such as by releasing a button or lever, shall have any exposed flame completely extinguished within 3 s after such action is completed, when tested in accordance with 7.3. In the case of postmixing burner utility lighters that have shields, an additional 3 s afterburn is acceptable if the flame height during this additional 3 s period does not extend above the shield.

3.5.3 Adjustable and non-adjustable premixing burner utility lighters

Adjustable premixing burner utility lighters when set at a flame height of 75 mm (or the maximum height the adjustment allows if lower than 75 mm), or non-adjustable premixing burner utility lighters at their permanently set flame heights, after a 20 s burn, when extinguished in the intended manner, such as by releasing a button or lever, shall have any exposed flame completely extinguished in no more than 6 s, when tested in accordance with 7.3.

NOTE A total afterburn of 6 s in this International Standard will be reconsidered periodically with a view to gradual reduction in line with technological progress.

3.6 Volumetric displacement

For utility lighters shipped with fuel, the liquid portion of the fuel shall not exceed 85 % of the volumetric capacity of the fuel chamber when tested in accordance with 7.11.

4 Structural-integrity requirements

4.1 General

Utility lighters shall have structural integrity as specified in 4.2 to 4.9.

4.2 Resistance to dropping

4.2.1 Utility lighters, as defined in 2.6, shall be capable of withstanding three separate (1,5 ± 0,1) m drops, conducted in accordance with 7.4, without fuel reservoir fragmentation, without sustained self-ignition as defined in 2.15, without a leakage rate exceeding 15 mg/min and without impairing the subsequent safe operation of the utility lighter.

4.2.2 Utility lighters that meet the requirements of 4.2.1, and that are able to be ignited in the intended manner, shall subsequently meet the applicable requirements of Clause 3 of this specification.

4.2.3 Utility lighters that are not able to be ignited in the intended manner do not constitute a failure.

4.3 Resistance to elevated temperature

4.3.1 Utility lighters shall be capable of withstanding a temperature of 65 °C for 4 h when tested in accordance with 7.5.

4.3.2 Utility lighters that meet the requirements of 4.3.1 and that are still able to be ignited in the intended manner after stabilization at (23 ± 2) °C shall be capable of meeting the applicable requirements of Clause 3 of this specification.

4.4 Burning behaviour

4.4.1 Adjustable utility lighters with the flame height set at maximum, or non-adjustable utility lighters at their permanently set flame heights, shall be capable of withstanding a burning time of 10 s in two different attitudes:

a) with the flame directed vertically upward;

b) with the flame directed 45° below horizontal.

4.4.2 First test the utility lighter with the flame directed vertically upward. There shall be no evidence of any burning or distortion of components so as to cause a hazardous condition.

4.4.3 Utility lighters that meet the requirements of 4.4.2 and that are still able to be ignited in the intended manner after stabilization for 5 min at (23 ± 2) °C shall be tested in the same manner with the flame directed 45° below horizontal, as shown in Figure 3. There shall be no evidence of any burning or distortion of components so as to cause a hazardous condition.

4.5 Resistance to continuous burn

All utility lighters shall be capable of withstanding a continuous-burning time of 2 min when tested in accordance with 7.6.

4.6 Resistance to cyclic burn

All utility lighters shall be capable of withstanding a burning time of 20 s, repeated 10 times, when tested in accordance with 7.7

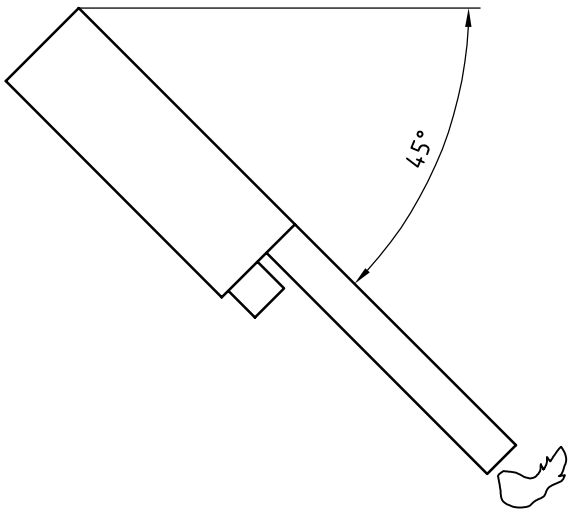

Figure 3 — Position of specimen for the burning test described in 4.4.3

4.7 External finish

Utility lighters shall have no external sharp edges that could cause accidental cuts or abrasions to the user when handled or used in the intended manner.

4.8 Compatibility with fuel

Components of utility lighters, as defined in 2.6, that come in contact with the fuel supplied with the utility lighter or recommended by the manufacturer shall not deteriorate, after exposure to the fuel, so as to cause the utility lighter to fail any of the criteria contained in this specification or allow a leakage rate exceeding 15 mg/min, when tested in accordance with 7.8.

4.9 Resistance to internal pressure

Utility lighter fuel chambers shall be capable of withstanding an internal pressure of two times the vapour pressure occurring at 55 °C of the fuel recommended by the manufacturer, when tested in accordance with 7.9.

5 Refilling of utility lighters

5.1 Refillable utility lighters, as defined in 2.11, shall include specific instructions and warnings as applicable in accordance with Clause 6.

5.2 The refilling valve in a refillable utility lighter shall be secure enough so as not to allow a leakage rate exceeding 15 mg/min, when tested in accordance with 7.10

6 Instructions and warnings

6.1 Safety information

6.1.1 General

All utility lighters shall be accompanied by the appropriate safety information (instructions or warnings, or both) communicating the proper method of use.

6.1.2 Location

This safety information shall be either on the utility lighters themselves, or on a separate brochure or pamphlet packaged with the utility lighters or on the consumer product packaging provided for the point of sale. The format for this information shall emphasize the warnings that are most appropriate to the type of utility lighter. This safety information shall be conspicuously placed with contrasting background colour, type size or style that makes it distinct from other information.

6.1.3 Content

6.1.3.1 For all utility lighters, safety information shall be accompanied by the specific signal word "**WARNING**" in close proximity to the safety information.

6.1.3.2 For all utility lighters, the safety information shall contain the following statements:

a) **"KEEP AWAY FROM CHILDREN"** or **"KEEP OUT OF REACH OF CHILDREN"**. (The statement used shall be emphasized and distinctive.)

b) "Ignite utility lighter away from face and clothing".

c) "Do not use to light cigarettes, cigars or pipes".

6.1.3.3 For all utility lighters, the safety information may include the substance of the following as appropriate for the utility lighter type:

a) “Be sure flame is out after use”. (This statement shall accompany all self-extinguishing lighters.)

b) “Never expose to heat above 50 °C or to prolonged sunlight”.

c) “Never puncture or put in fire”.

d) “Extreme heat is present above the visible flame. Extra care should be taken to prevent burn, injury or fire.” (This statement shall accompany all premixing burner lighters.)

e) “Follow all instructions and warnings provided by grill or other appliance manufacturer when using this product”.

f) “Do not keep lit for more than 30 s”.

g) “After refilling, wait 2 min before using lighter”. (This statement shall accompany all refillable utility lighters.)

h) “Contains flammable gas under pressure” or “When filled, will contain flammable gas”.

6.2 Refilling instructions

Refillable utility lighters, as defined in 2.11, shall be accompanied by specific instructions as to the correct procedure to accomplish the refill operation. These instructions shall include the fuel recommended by the manufacturer and the appropriate information to ensure the proper mating between the refill container and the fuel reservoir of the utility lighter.

7 Test methods

7.1 Flame height measurement

7.1.1 General

The purpose of this procedure is to define the method of measurement of utility lighter flame height.

7.1.2 Apparatus

Required is a non-flammable board scribed in 5 mm increments. The board shall be fitted with a standoff at the base point that positions the utility lighter at least 25 mm from the board. The board can be supported vertically by any convenient means. Tests shall be conducted inside a draught-free chamber constructed from suitable non-flammable materials.

7.1.3 Test specimens

The test specimens shall consist of utility lighters that are fuelled in accordance with the manufacturer’s specifications.

7.1.4 Procedure

7.1.4.1 Standardize the utility lighter flame height measurements by stabilizing all utility lighters at (23 ± 2) °C for at least 10 h prior to each flame height measurement.

7.1.4.2 Place the utility lighter against the standoff so that the flame will be directed vertically upward.

7.1.4.3 Ignite the utility lighter and measure the flame height to the nearest 5 mm by determining where the tip of the visible flame registers in relation to the scribed marks on the board behind the utility lighter, during a 5 s burn.

NOTE In the case of premixing burner lighters, it is recommended this test be conducted under subdued lighting conditions.

7.2 Spitting, sputtering and flaring tests

7.2.1 General

The purpose of these tests is to verify that utility lighters do not spit, sputter or flare.

7.2.2 Test specimens

The test specimens shall consist of utility lighters that are fuelled in accordance with the manufacturer's specifications.

7.2.3 Procedure

7.2.3.1 Stabilize all utility lighters at (23 ± 2) °C for at least 10 h prior to performing the test described in 7.2.3.3.

7.2.3.2 If utility lighters are adjustable, as defined in 2.7, adjust the flame to its maximum height.

7.2.3.3 Ignite the utility lighter and observe for spitting or sputtering as defined in 2.16 during a 12 s continuous burn in three positions:

a) 4 s with the flame horizontal;

b) 4 s with the flame 45° below the horizontal;

c) 4 s with the flame directed vertically upward.

7.2.3.4 Subsequently ignite the utility lighter with the flame directed vertically upward, observe the flame height and rotate the utility lighter to an inverted position 45° below horizontal. Any variation in flame height exceeding 50 mm during a total elapsed time of 10 s, or a flame height exceeding the requirements specified in 3.2, constitutes a failure. If the utility lighter does not fail, restabilize for a minimum of 5 min at (23 ± 2) °C before continuing with 7.2.3.5.

7.2.3.5 Measure the flame height (L_1 + L_2) in accordance with Figure 4.

NOTE If different utility lighters are used to conduct the tests described in 7.2.3.3, 7.2.3.4, and 7.2.3.5, stabilize these in accordance with 7.2.3.1.

7.2.3.6 Invert the utility lighter for a period of 10 s. Reorient the utility lighter with the flame directed vertically upward and immediately ignite the utility lighter. Observe the flame height during a 10 s burn. Any variation in flame height exceeding 50 mm, or a flame height exceeding the requirements specified in 3.2, constitutes a failure.

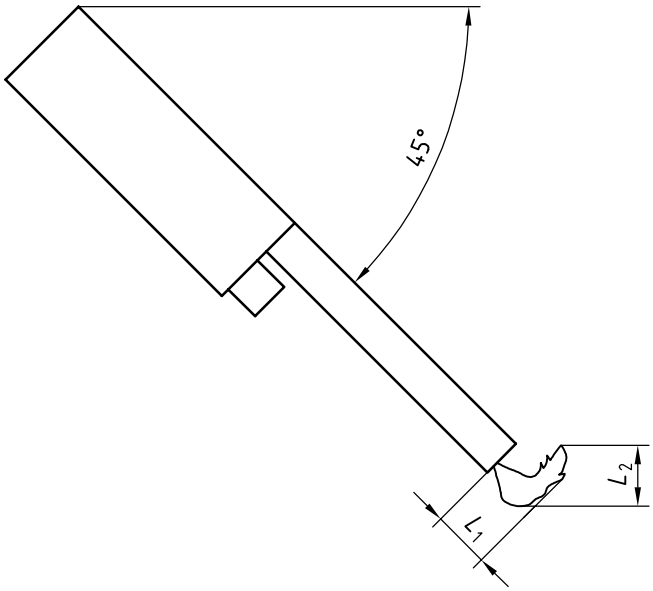

Figure 4 — Position of specimen for the flame height measurement test (see 7.2.3.5)

7.3 Flame extinction test

7.3.1 General

The purpose of this test is to verify that utility lighters extinguish safely.

7.3.2 Test specimens

The test specimens shall consist of utility lighters that are fuelled in accordance with the manufacturer's specifications.

7.3.3 Apparatus

Use the same apparatus as for flame height measurement, described in 7.1.2.

7.3.4 Procedure

7.3.4.1 Stabilize all test specimens at (23 ± 2) °C for at least 10 h.

NOTE It is recommended that the test be conducted under subdued lighting conditions.

7.3.4.2 Place the utility lighter against the flame height measurement apparatus with the flame directed vertically upward, ignite and adjust to the flame height specified in 3.5.1, 3.5.2 or 3.5.3, as applicable, then extinguish and allow to cool for 1 min. Then, orient the utility lighter in the 45° below horizontal attitude, ignite the utility lighter for the amount of time specified in 3.5.1, 3.5.2 or 3.5.3, then extinguish in the normal manner. Measure and record the time of any burning occurring after the extinguishing action. Afterburns in excess of the amount of time specified in 3.5.1, 3.5.2 and 3.5.3 constitute a failure.

7.3.4.3 If the flame extinction test needs to be repeated on the same test specimen, restabilize it at a temperature of (23 ± 2) °C for at least 10 h.

7.4 Drop test

7.4.1 General

The purpose of this test is to determine if dropping a utility lighter onto a hard surface will result in fuel reservoir fragmentation, sustained self-ignition or a leakage rate exceeding 15 mg/min, and whether it will impair subsequent operation in a safe manner.

7.4.2 Significance

The drop test provides information on the ability of the utility lighter to withstand safely a drop that is possible during the use of the utility lighter.

7.4.3 Apparatus

7.4.3.1 **Concrete surface**.

7.4.3.2 **Height-indicating device**, marked to indicate a height of 1,5 m above the concrete surface.

7.4.3.3 **Weighing device**, capable of reading to within 0,1 mg.

7.4.4 Test specimens

7.4.4.1 General

The specimens shall consist of new, complete, normally-fuelled utility lighters and shall be initially free of mechanical damage. Utility lighters used in the tests specified in 3.1 to 3.5 inclusive may be used for these drop tests.

7.4.4.2 Specimen 1

Stabilize a utility lighter at (23 ± 2) °C for at least 10 h and, if it incorporates a flame-height adjustment feature, adjust the flame to its maximum height.

7.4.4.3 Specimen 2

Maintain a utility lighter at a temperature of (– 10 ± 2) °C for 24 h and then stabilize at a temperature of (23 ± 2) °C for at least 10 h. For an adjustable utility lighter, set the flame height at 75 mm maximum.

7.4.5 Procedure

7.4.5.1 Allow each specimen to fall freely from 1,5 m onto the concrete surface, orienting it on release in the following three attitudes: nozzle up, nozzle down and horizontal.

7.4.5.2 Observe the specimen during each drop for fuel reservoir fragmentation that will present a hazard to anyone in proximity or for sustained self-ignition. Either condition constitutes a failure.

7.4.5.3 Within 5 min after the three drops, determine by weighing over an elapsed time of 1 min whether the leakage rate exceeds 15 mg/min. A leakage rate exceeding this amount constitutes a failure.

7.4.5.4 Utility lighters that do not fail the test described in 7.4.5.1 to 7.4.5.3 and are able to be ignited in the intended manner shall subsequently meet all requirements of Clause 3.

7.4.5.5 Utility lighters that are not able to be ignited in the intended manner do not constitute a failure.

7.5 Elevated temperature test

7.5.1 General

The purpose of this test is to determine if a fuel reservoir, including closures, will withstand elevated temperatures.

7.5.2 Significance

This test provides information on the ability of a fuel reservoir, including closures, to withstand elevated temperatures without a leakage rate exceeding 15 mg/min, without fuel reservoir rupture and without subsequent operation of the utility lighter in a safe manner being impaired. Lighters which are empty of liquid fuel after the test constitute a failure.

7.5.3 Apparatus

7.5.3.1 **Enclosure**, vented to prevent accumulation of gas, capable of maintaining a temperature of (65 ± 2) °C.

7.5.3.2 **Temperature-measuring device**, measuring the temperature to within ± 2 °C.

7.5.3.3 **Weighing device**, capable of reading to within 0,1 mg.

7.5.4 Test specimens

The specimens shall consist of new, normally-fuelled utility lighters and shall be initially free of mechanical damage or utility lighters used in the tests specified in 3.1 to 3.5 inclusive may be used for this temperature test.

7.5.5 Procedure

7.5.5.1 Stabilize the enclosure at (65 ± 2) °C.

7.5.5.2 Ignite each specimen to ensure the lighter is not empty of fuel, extinguishing them afterwards.

7.5.5.3 Place the specimens in the enclosure for 4 h.

7.5.5.4 Remove the specimens and stabilize at (23 ± 2) °C for at least 10 h.

7.5.5.5 After temperature stabilization, determine by weighing over a period of time of 1 min if the leakage rate exceeds 15 mg/min. A leakage rate exceeding 15 mg/min constitutes a failure.

7.5.5.6 If the fuel reservoir is totally or partially transparent, observe visually the presence of liquid fuel inside the reservoir. The absence of liquid fuel indicates the lighter is empty which constitutes a failure.

7.5.5.7 If the fuel reservoir is not transparent, attempt to ignite the lighter. If ignition in the intended manner is achieved, proceed to 7.5.5.8. If not:

a) weigh the lighter with a weighing device capable of reading to within 0,1 mg;

b) open the reservoir (pushing the sealing ball or opening the burner valve for a non-refillable lighter or opening the refilling valve for a refillable lighter);

c) weigh the lighter again with all its components.

If the mass is unchanged (within ± 10 mg), the lighter was an empty lighter, which constitutes a failure.

7.5.5.8 Utility lighters that are able to be ignited in the intended manner shall subsequently meet all the applicable requirements of Clause 3 of this specification.

7.5.5.9 Utility lighters that are not able to be ignited in the intended manner and are not empty of fuel do not constitute a failure.

7.6 Continuous-burn test

7.6.1 General

The purpose of this test is to determine if utility lighters can withstand continuous burning for 2 min without continued burning of component parts or fuel reservoir rupture either with or without a flame.

7.6.2 Test specimens

The test specimens shall consist of new, normally-fuelled utility lighters and shall be initially free of mechanical damage. Utility lighters used in the tests specified in 3.1 to 3.5 inclusive may be used for this burning test.

7.6.3 Apparatus

Any draught-free chamber constructed from a suitable non-flammable material may be used.

7.6.4 Procedure

7.6.4.1 Test adjustable postmixing burner utility lighters with the flame set at 75 mm (or the maximum flame height the adjustment allows if lower than 75 mm), or adjustable premixing burner utility lighters set at 60 mm (or the maximum flame height the adjustment allows if lower than 60 mm) or non-adjustable utility lighters with flames at their permanently set flame heights.

7.6.4.2 Stabilize the utility lighters at a temperature of (23 $\pm$ 2) °C for at least 10 h.

7.6.4.3 Orient each utility lighter with the nozzle pointed 45° below horizontal, ignite and allow to burn for 2 min.

7.6.4.4 At any time during the 2 min burn, the appearance of any of the conditions enumerated in 7.6.1 constitutes a failure.

7.6.4.5 Utility lighters used for the continuous-burn test shall not be used for any other tests in this consumer-safety specification.

7.7 Cyclic burning time test

7.7.1 General

The purpose of this test is to determine if utility lighters can withstand a burning time of 20 s repeated 10 times with a 5 min rest period between burnings.

7.7.2 Significance

It is important that utility lighters are able to withstand this test without subsequent operation of the utility lighter in a safe manner being impaired.

7.7.3 Test specimens

The specimens shall consist of new, normally-fuelled utility lighters and shall be initially free of mechanical damage. Utility lighters used in the tests specified in 3.1 to 3.5 inclusive may be used for this burning test.

7.7.4 Procedure

7.7.4.1 Test adjustable postmixing burner utility lighters with the flame set at 75 mm (or the maximum flame height the adjustment allows if lower than 75 mm), or adjustable premixing burner utility lighters set at 60 mm (or the maximum flame height the adjustment allows if lower than 60 mm) or non-adjustable utility lighters with flames at their permanently set flame height.

7.7.4.2 Stabilize the utility lighters at a temperature of (23 ± 2) °C for at least 10 h.

7.7.4.3 Orient each utility lighter with the nozzle pointed 45° below horizontal, ignite and allow to burn for 20 s.

7.7.4.4 Allow the extinguished utility lighter to rest for 5 min.

7.7.4.5 Repeat 7.7.4.3. and 7.7.4.4 nine more times making a total of 10 cycles.

7.7.4.6 Stabilize the test specimens at a temperature of (23 ± 2) °C for at least 10 h.

7.7.4.7 Utility lighters that are able to be ignited in the intended manner shall subsequently pass all the applicable requirements of Clause 3.

7.7.4.8 Utility lighters that are not able to be ignited in the intended manner do not constitute a failure.

7.8 Fuel compatibility test

7.8.1 General

The purpose of this test is to determine if utility lighter components coming in contact with the fuel recommended by the manufacturer deteriorate in any fashion, resulting in an empty utility lighter or a leakage rate exceeding 15 mg/min.

7.8.2 Test specimens

The test specimens shall consist of new, normally-fuelled utility lighters and shall be initially free of mechanical damage. Utility lighters used in the tests specified in 3.1 to 3.5 inclusive may be used for this compatibility test.

7.8.3 Apparatus

7.8.3.1 **Enclosure**, ventilated to prevent accumulation of gas, capable of maintaining a temperature of (40 ± 2) °C.

7.8.3.2 **Temperature-measuring device**, accurate to ± 1 °C in the range 35 °C to 45 °C.

7.8.3.3 **Weighing device**, capable of reading to within 0,1 mg.

7.8.4 Procedure

7.8.4.1 Stabilize the enclosure at a temperature of (40 ± 2) °C.

7.8.4.2 Ignite each specimen to ensure the lighter is not empty of fuel, extinguishing them afterwards.

7.8.4.3 Place the specimens in the enclosure for 28 days.

7.8.4.4 Remove the specimens and stabilize at (23 ± 2) °C for at least 10 h.

7.8.4.5 After temperature stabilization, determine by weighing over a period of 1 min if the leakage rate exceeds 15 mg/min. A leakage rate exceeding 15 mg/min constitutes a failure.

7.8.4.6 If the fuel reservoir is totally or partially transparent, observe visually the presence of liquid fuel inside the reservoir. The absence of liquid fuel indicates the lighter is empty which constitutes a failure.

7.8.4.7 If the fuel reservoir is not transparent, attempt to ignite the specimen. If ignition in the intended manner is achieved, proceed to 7.8.4.8. If not:

a) weigh the lighter with a weighing device capable of reading to within 0,1 mg;

b) open the reservoir (pushing the sealing ball or opening the burner valve for a non-refillable lighter or opening the refilling valve for a refillable lighter).

c) weigh the utility lighter again with all its components.

If the mass is unchanged (within ± 10 mg), the lighter was an empty lighter, which constitutes a failure.

7.8.4.8 Utility lighters that are able to be ignited in the intended manner shall subsequently meet all the applicable requirements of Clause 3 of this specification.

7.8.4.9 Utility lighters that are not able to be ignited in the intended manner and are not empty of fuel do not constitute a failure.

7.9 Internal-pressure test

7.9.1 General

The purpose of this test is to determine if the fuel reservoir, including closures, will safely withstand abnormally high internal pressure.

7.9.2 Significance

This test provides information on the ability of a utility lighter, including closures, to withstand an internal pressure of two times the vapour pressure occurring at 55 °C.

7.9.3 Apparatus

Any apparatus capable of producing an internal gauge pressure of 3 MPa is suitable.

7.9.4 Test specimens

The specimens shall consist of new utility lighters that have been drained of fuel and are free of mechanical damage. Utility lighters used in the tests specified in 3.1 to 3.5 inclusive may be used for this pressure test.

7.9.5 Procedure

7.9.5.1 Conduct the test at a temperature of (23 ± 2) °C.

7.9.5.2 Subject each specimen to an internal pressure of two times the vapour pressure occurring at 55 °C, increasing the pressure at a rate not exceeding 69 kPa/s.

7.9.5.3 If there is no sudden drop in pressure during the course of the test, the utility lighter fuel reservoir and closures are considered acceptable.

7.10 Refilling test

7.10.1 General

The purpose of this test is to ensure that no dangerous leak occurs from the refilling valve of a refillable utility lighter.

7.10.2 Procedure

Empty and refuel a refillable utility lighter by the method, and using the fuel, recommended by the manufacturer. Measure by weighing within 15 min whether the leakage rate exceeds 15 mg/min. A leakage rate exceeding this value constitutes a failure.

7.11 Fuel volumetric-displacement test

7.11.1 General

The purpose of this test is to determine the amount of volumetric displacement of the liquid portion of the fuel relative to the volumetric capacity of the fuel reservoir.

7.11.2 Apparatus

Required is a weighing device capable of reading to within 0,1 mg.

7.11.3 Test specimens

The test specimens shall consist of utility lighters as prepared for shipment.

7.11.4 Procedure

7.11.4.1 Stabilize all test specimens at (23 ± 2) °C for at least 10 h prior to the test.

7.11.4.2 Determine the mass of the fuel by weighing the full unused utility lighter or fuel reservoir, draining the fuel and reweighing the empty utility lighter or fuel reservoir after 30 min.

7.11.4.3 Calculate the volume V_1 of the liquid portion of the fuel, in cubic centimetres, from the density of the fuel at (23 ± 2) °C, as follows:

$$V_1 = \frac{m_f}{\rho_f}$$

where

m_f is the mass of the fuel, in grams;

ρ_f is the density of the fuel at (23 ± 2) °C, in grams per cubic centimetre.

7.11.4.4 If the fuel type and formulation is known, use the density of that fuel. If not, use 0,54 g/cm^3 for the density.

7.11.4.5 Drill a hole no larger than 6 mm in the fuel reservoir and then weigh the utility lighter or fuel reservoir.

7.11.4.6 Fill the fuel reservoir with distilled water at a temperature of (23 ± 2) °C, using a syringe or other suitable device, ensuring that there are no air bubbles inside the reservoir.

7.11.4.7 Depending upon the design (size, shape and wall thickness) of the utility lighter and its fuel reservoir, a vent hole may need to be drilled into the fuel reservoir to facilitate the removal of trapped air during filling. If a vent hole is used, weigh the utility lighter or fuel reservoir after drilling both the filling and the vent holes.

7.11.4.8 Weigh the water-filled utility lighter or fuel reservoir.

7.11.4.9 Determine the mass of the water by subtracting the mass of the empty utility lighter or fuel reservoir from the mass of the water-filled utility lighter or fuel reservoir, or by measuring the amount of water required to fill the utility lighter or fuel reservoir, or by any other convenient means.

7.11.4.10 Calculate the volume V_0 of the utility lighter reservoir, in cubic centimetres, as follows:

$$V_0 = \frac{m_w}{\rho_w}$$

where

m_w is the mass of the water, in grams;

ρ_w is the density of water at (23 ± 2) °C, in grams per cubic centimetre.

7.11.4.11 Utility lighters with a ratio of V_1/V_0 greater than 0,85 constitute a failure.

8 Product marking

All utility lighters shall bear a permanent logo or name that identifies the manufacturer or distributor.

Annex A
(informative)

Manufacturer's acceptance quality limits for specification and inset limits for flame characteristics in 3.2.2 to 3.2.7

A.1 Finished utility lighters should comply with the following acceptance quality limits (AQLs). These AQLs call for measurements of flame height at the specification limit and a narrow (or inset) limit just below the specification limit.

A.2 For this purpose, AQL means the maximum percentage of finished products, lying between or exceeding the specified limits, acceptable as a process average.

Manufacturers should ensure that percentages of finished products lying between or exceeding the specified limits are no greater than those given in Clauses A.3 to A.8:

A.3 For non-adjustable postmixing burner utility lighters as in 3.2.2:

AQL for maximum flame height greater than 100 mm, 1 %;

AQL for maximum flame height between 90 mm and 100 mm, 10 %.

A.4 For non-adjustable premixing burner utility lighters as in 3.2.3:

AQL for maximum flame height above 75 mm, 1 %;

AQL for maximum flame height between 60 mm and 75 mm, 10 %.

A.5 For adjustable postmixing burner utility lighters as in 3.2.4:

AQL for maximum flame height above 150 mm, 1 %;

AQL for maximum flame height between 125 mm and 150 mm, 10 %.

A.6 For adjustable premixing burner utility lighters as in 3.2.5:

AQL for maximum flame height above 75 mm, 1 %;

AQL for maximum flame height between 60 mm and 75 mm, 10 %.

A.7 For adjustable postmixing burner utility lighters as in 3.2.6:

AQL for first-strike flame height above 100 mm, 1 %;

AQL for first-strike flame height between 90 mm and 100 mm, 10 %.

A.8 For adjustable premixing burner utility lighters as in 3.2.7:

AQL for first-strike flame height above 60 mm, 1 %;

AQL for first-strike flame height between 50 mm and 60 mm, 10 %.

Bibliography

In order to meet the AQLs in Annex A.1, methods from (but not limited to) the following published documents may be used. Other custom-designed plans and statistical methods may be used at the manufacturer's discretion.

For inspection at the specification and inset limits concurrently:

[1] *Trinomial Sampling Plans to Match MIL-STD-105D*, 1983 ASQC Quality Congress Transactions, ASQC Milwaukee

For inspection at the specification or inset limits, or both, separately:

[2] ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

Where good process history has been established, and nonconforming units are removed from rejected lots, see AOQL tables in:

[3] DODGE and ROMIG, *Sampling Inspection Tables — Single and Double Sampling*, J. Wiley and Sons, New York, USA

Where flame height measurements are recorded and a stable normal distribution of product is established:

[4] ISO 3951, *Sampling procedures and charts for inspection by variables for percent nonconforming*

For controlling the mean and spread of the product distribution:

[5] *Manual on Presentation of Data and Control Chart Analysis*, ASTM STP 15D, ASTM, 1976

[6] *Glossary and Table for Statistical Quality Control*, American Society for Quality Control

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