LVD ADCO Low Voltage Directive Administrative Cooperation

Non-functional Hot Surfaces Project

Coordinating authority: Danish Safety Technology Authority

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Summary of the report

The report addresses only one specific safety parameter of household products: The temperatures of non-functional hot surfaces. The products investigated are all belonging to the following product groups:

1. Mini oven
2. Raclette
3. Toaster
4. Contact grill, sandwich toaster, waffle iron

All the product groups are covered by the same product standard EN 60335-2-9 *"Safety of electric grills, toasters and similar portable cooking appliances"*

As a result of fact that this standard has not adequately addressed the safety problem concerning temperatures of hot surfaces likely to be touched, the standard has been amended two times in Europe and due to long transitional periods, where the manufacturer can choose to use either the basic standard or the standard with the amendment, then the report needs to address the different cases where the product is either declared to be in accordance with the basic standard alone or with the basic standard and amendment A12 or with the basic standard together with amendment A13.

For comparison, all the results are also evaluated against the recommendations given in CENELEC Guide 29 *"Temperatures of hot surfaces likely to be touched – Guidance document for Technical Committees and manufacturers"*.

The testing was carried out by 11 countries. 196 products were tested out of which 191 were unique products, which mean that 5 times the same products was tested by two different member states.

The main results were that for assessment against Amendment A12 of EN 60335-2-9 49% (97 products) were in accordance with the temperature limits in the standard. 51% (98 products) were not in compliance with the standard, whereas 20 % (39 products) exceeded the limits for temperature rise by more than 50 degree Kelvin.

If the same results are assessed against Amendment A13 of EN 60335-2-9 24% (47 products) were in accordance with the temperature limits in the standard. 76% (149 products) were not in compliance with the standard, whereas 29 % (56 products) exceeded the limits for temperature rise by more than 50 degree Kelvin.

Amendment A13 does, however, allow the temperature rise to be two times the limit if the manufacturer attaches a warning symbol to the hot surface. If we take this into account, then the picture for A13 changes dramatically. Assessed against A13 with the warning label included 72% (141 products) were in accordance with the temperature limits in the standard. 28% (55 products) were not in compliance with the standard, whereas 9 % (17 products) exceeded the limits for temperature rise by more than 50 degree Kelvin.

The use of warning labels allows e.g. touchable bare metal to reach a temperature of 115^{o}C at a room temperature of 25^{o}C. In the CENELEC Guide 29, the scientific curves shows that you will suffer from burn if you touch bare metal at a temperature of 73^{o}C for longer than 0,5 s. So you can only hope that all persons in the household and their guests are able to read and understand the warning sign before they accidentally touch the mini oven.

The warning marks were also investigated. 73% (142 products) did not have a warning symbol for a hot surface. Out of the remaining 27% (54 products), only 12% (24 products) had a correct warning symbol. The remaining 15% (30 products) had a wrong warning symbol, which is more serious than a formal non-compliance.

Finally we have compared all the results with the recommendations in CENELEC Guide 29. If those limits were in use (no warning labels are allowed in Guide 29), then only 23% (46 products) were in accordance with the temperature limits in the standard. 77% (150 products) were not in compliance with the standard, whereas 35 % (69 products) exceeded the limits for temperature rise by more than 50 degree Kelvin.

Other findings in the project were that some manufacturers are very creative, when it comes to take advantages of the loopholes in the standard. One of the loopholes is that areas around the ventilation holes are not limited with respect to temperature limits. Some of the products tested had ventilation areas, which cover a very high percentage of the touchable surface area. This is, of course, not acceptable and the utilization of large surface areas as ventilation zones should be limited only to practical functional level. The project group disagrees with this intentional omission of measurements in the case that large areas of the product surface are designed to be a ventilation zone.

It is therefore recommended that CENELEC takes on board to revisit their standards in order to align them further to CENELEC Guide 29, having in mind that warnings should only be used as a last resort if safety cannot be achieved by design – it should not be a common used escape clause in the standard. Concerning the other escape clause, which urges some manufacturers to introduce large areas of ventilation, there should be clear guidelines/limits in the standards for the allowed maximum ventilation areas.

Manufacturers are, especially, urged to pay more attention to the temperature limits. A serious non-compliance level where the temperature rise is more than 50K above the allowed upper limit, we find for 20% of the products against amendment A12 and 9% against amendment A13, which is far too much.

Finally I would like to express thanks to the market surveillance authorities from Belgium, Bulgaria, Denmark, Finland, Germany, Luxembourg, The Netherlands, Norway, Spain, Sweden and Switzerland for their participation. Thanks to Germany and Denmark for being in charge of the project.

December 2012
Jan Roed, Chairman LVD ADCO.

1. Introduction

Non-functional hot surfaces of products are the surface areas, which do not need to be hot in order for a product to serve its function and a surface which the user might touch accidentally, such as the top of a mini-oven. It is the experience of European Market Surveillance Authorities, that these non-functional surfaces sometimes become so hot, which creates a safety problem for the usage of the product.

Market surveillance authorities have addressed this problem in the past with toasters. Following the Commissions opinion from 2002, the European Standard EN 60335-2-9 did not adequately address the safety issue arising from the non-functional hot surfaces and CENELEC was called to update the standard.

The follow-up action taken at that time by the Commission was to issue a Mandate M/346 requesting CENELEC not only to update the standard for toasters, but in general to update all relevant standards as necessary. In response to the Mandate, CENELEC developed a guide for their Technical Committees, “Guide 29 Temperatures of hot surfaces likely to be touched – Guidance document for Technical Committees and manufacturers´. This guidance document should ensure that whenever a product standard was updated in CENELEC, then the committee was guided in how to address the topic of hot surfaces – and given directions on how to set appropriate temperature limits. This guide was issued in April 2007.

In 2010 the situation was that a number of relevant standards had been updated since 2007, but very few of the updated standards respected the limits proposed by Guide 29. Even the standard originally in question, EN 60335-2-9 *"Safety of electric grills, toasters and similar portable cooking appliances",* had been amended two times, but still did not meet the intentions of Guide 29.

The report covers the project "Non-functional Heat Surfaces", which has been made according to a decision at the ADCO meeting in Amsterdam in spring 2011, at which a proposal for the project prepared by a small working group was presented.

At the meeting, it was generally agreed among the member states that the project should be initiated as a joint market surveillance project on devices belonging under the standard EN 60335-2-9 *"Safety of electric grills, toasters and similar portable cooking appliances",* as these products are considered to have the highest temperatures on non-functional hot surfaces that are likely to be touched during the foreseeable usage.

11 states have taken part in the project which all in all includes testing of totally 196 products. Out of these 196 products, only 5 products have been tested by more than one authority; this means that 191 unique products are part of the project.

2. Purpose of the Project

The purpose of the project is to show with the aid of the collected data that the products belonging under the standard EN 60335-2-9 do not comply with the temperature limits given by CENELEC GUIDE 29 and that the actual temperatures on non-functional surfaces if touched, can cause burn giving permanent injuries.

Moreover, the purpose of the report is to show to the commission that the current standard does not protect against all the temperature risks that exist on the product types studied in this joint action.

3. Specification of the Project

In this joint market surveillance project, with participation of authorities from 11 states, each state could freely select how many and which products they wanted to test from the product types mentioned below.

At beginning of the project, it was decided to limit the project to the following product types, all of which are covered by the standard EN 60335-2-9.

1. Mini oven
2. Raclette
3. Toaster
4. Contact grill
5. Sandwich toaster
6. Waffle iron

As the product groups contact grill, sandwich toaster and waffle iron are very similar to each other, it has been decided that they are handled in one common category which practically means that the project covered the following 4 categories:

1. Mini oven
2. Raclette
3. Toaster
4. Contact grill, sandwich toaster, waffle iron

The market surveillance action covered by this project is only aiming at determining the temperature levels at the touchable surface for the product categories mentioned above. It was the aim to establish knowledge about which standards (and in particular – which issue of the standard) the industry referred to in their declaration of conformity. It was as well an aim to gain experience in the measurement technique and to see if the measurements were complying with the limits in the standard.

The performed safety tests in this project were limited only to the measurements of temperatures on the potentially hot surfaces and to the related factors.

The member states could, however, freely extend the safety testing of the products but the extended tests were not part of the project.

Since differences exist between the individual states' opportunities of sanctions, if the products do not meet the safety objectives of LVD, the individual authorities may decide which sanctions they will/can use.

To ensure that the reporting was carried out identically, a detailed reporting form was drawn up as a Excel spread sheet. It was planned that the project should include the following examinations and tests:

Document control:

- CE marking
- Declaration of conformity (DoC)
- Date of Issue for declaration of conformity
- Time when the product had been placed on the EU market
- Which editions of the standard had been used in DoC and whether they were valid at the time of placing on the marketing
- To check if instructions for safety and use are available in the national language
- Use of warning label: (CAUTION: Hot surface or Symbol 5041 of IEC 60417).

Test

- Thermometry of the product – also at the places which exempt the standard from measurement.
- Validation of the measurement results by comparing them against current editions of the standards and the temperature limits in Guide 29

Output of project

- Assessment of to which extent the tested products meet the requirements set out in the current editions of the standards
- Assessment whether the requirements of the standard are sufficient to prevent permanent injuries in connection with contact of hot non-functional surfaces of the tested product types.

The above mentioned assessments are made for each product type and an overall assessment including all product types has also been made.

4. Brief Explanation for CENELEC GUIDE 29

Guide 29 aims to give guidelines how to protect everybody who can touch hot surfaces (which are intended to be contacted) against burn.

The temperature limits in the guide are determined based on the material on the surface and contact time, where
the contact time corresponds to the person's reaction time which, according to Table 2 (extracted from the CENELEC Guide 29), is set on the basis of the age and the health condition of the person.

Table 2 – Contact period

Group	Contact period in seconds
Adults	0,5-1
Children less than 2 years	15
Children from 2 years to less than 6 years	4
Children from 6 years to less than 14 years	2
Elderly people	1-4
Physical disabilities	According to nature of disability

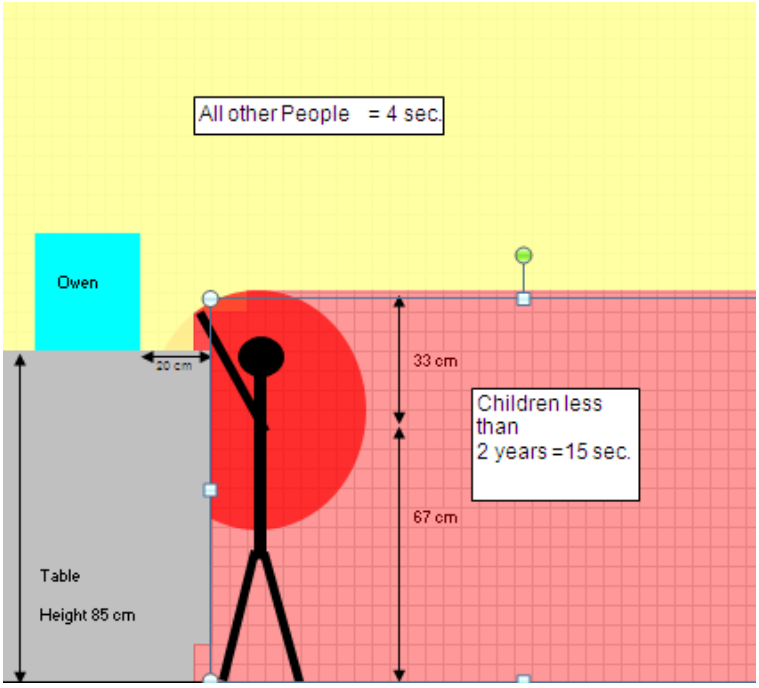
Setting of the age limits for children is based on whether children can touch the surface if the product is placed in the intended place of usage. It is assessed on basis of the reach of the age limit. (Table 1 extracted from the CENELEC Guide 29).

Table 1 – Arms reach

Age years	Arms reach [see Figure 2(a)], calculated from the floor metre
Children less than 2 years	1,00
Children from 2 years to less than 6 years	1,50
Children from 6 years to less than 14 years	1,80
Adult	2,30

The temperatures are given in CENELEC Guide 29 in form of curves, which indicates area of “no burn”, area of “burn” and an intermediate area of “burn threshold” based on contact time. There are a number of curves for different type of materials. These curves correspond to the table shown below. In the table the temperature values are converted from the curves into temperature rise measured in Kelvin at room temperature of 25° C.

Temp. rise in K/time in sec.		0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0	8.0	10.0	15.0
Bare Metal	Burn	48	45	43	42	41	39	38	38	37	37	35	34	33
	Burn Threshold	42	39	38	37	36	35	34	33	32	32	31	30	29
Coated Metal	Burn	59	54	51	49	47	44	42	42	41	40	37	35	34
	Burn Threshold	53	48	46	44	42	40	38	37	36	35	33	31	30
Ceramics	Burn	65	60	58	56	54	53	52	51	49	48	47	45	44
	Burn Threshold	59	55	52	50	49	48	47	46	44	43	42	40	39
Plastic	Burn	75	68	65	63	61	59	58	57	55	53	52	50	49
	Burn Threshold	66	60	58	55	53	52	51	51	49	48	47	45	44



Since all products that are in the scope of EN 603352-9 are designed to be placed at table height and slightly further back on the table, it is not considered possible that a child less than 2 years can touch, giving a contact time of 4 sec.

The outline shows a child less than 2 years who is trying to reach a Mini oven placed as intended on a table with the oven door 20 cm from the edge of the table.

The child is not able to reach the oven.

This means that there is no need for 15 sec. contact time, but 4 sec. will apply as the oven can be touched by all other persons including elderly persons with a reaction time down to 4 sec.

The same conditions apply to all products in the scope of EN 60 335-2-9.

Therefore, we have from the part of the authorities chosen to use 4 sec. contact time as the contact time for all products intended to be placed above 85 cm from the floor and 15 sec for all the products intended to be placed lower than 85 cm.

5. Brief Explanation for the Standard EN 60335-2-9

EN 60335-2-9 is the applicable standard for grill appliances, toasters and similar portable cooking appliances.

The following edition and amendments are applicable:

EN 60335-2-9: August 2003 – This edition of the standard does not include requirements for temperatures on non-functional surfaces, however, the following amendments include requirements for temperature limits.
References to this editions are written as /2-9.

EN 60335-2-9/A12: November 2007 - with (dop) 2008-10-01 and (dow) 2010-10-01
References to this editions are written as /A12.

EN 60335-2-9/A13: November 2010 - with (dop) 2011-10-01 and (dow) 2013-10-01
References to this editions are written as /A13.

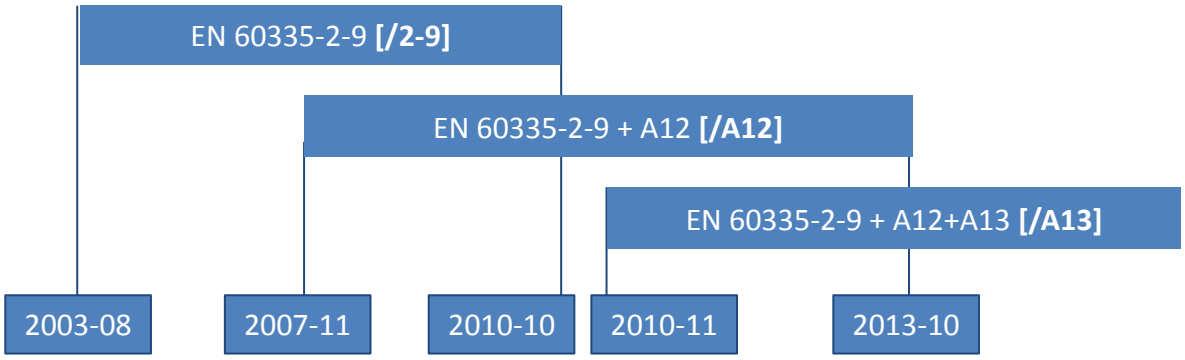


Figure 1 The transitional periods. If placed on the market before 2007-11 the product should comply with /2-9. Between 2007-11 and 2010-10 it should comply with either /2-9 or /A12. Between 2010-10 and 2010-11 it should comply with /A12. From 2010-11 to 2013-10 it should comply with either /A12 or /A13. After 2013-10 it should comply with /A13.

/2-9

/2-9 includes no requirements for limiting values on surface temperatures, but there are temperature limits on control buttons and hand grips as they are covered by EN 60335-1 (Table 3). Moreover, it is also required that cooking tops, portable ovens and rotary grills are equipped with warning labels containing the following text: CAUTION: Hot surface or Symbol 5041 of IEC 60417-1. The symbol must follow the colour requirements of the standard. The height of the triangle included in the symbol must be at least 12 mm high.
If symbol 5041 of IEC 60417-1 is marked on the unit, it must be stated in the operating instructions that the surfaces can become very hot during use of the device.

/A12

/A12 makes the following demands on temperatures on non-functional hot surfaces

Table Z101 – Temperature rise limits for surfaces

Surface	Temperature rise K	
	Top surfaces and door surfaces	Other surfaces [a b]
Metal and painted metal	85	60
Vitreous-enamelled metal	95	65
Glass and ceramic	95	65
Plastic having a thickness exceeding 0,3 mm	105	80

[a] For surfaces on the sidewalls within 25 mm from the level of the top surface, the temperature rise limits for top surfaces apply (Figure Z103, G).

[b] For the surface between the excluded area of 25 mm from the upper edge of the door and the level of the top surface, the temperature rise limits for top surfaces apply.

However, with the following exceptions:

- For ovens with max. setting >240 ºC the temperatures for top and door are increased by 10 K
- Many large areas are exempted for measuring, including
    - Areas on and at the edge of oven doors
    - Around ventilation holes, areas with a radius of 25 mm are exempted for measuring
    - Areas 25 mm from heat functional surfaces

/12 maintains the demands on warning label from /2-9
/12 has reasonable demands on reduced temperatures around hand grips and buttons; however, for other parts of the product the temperature limits are significantly higher than those which Guide 29 allows.

/A13

/A13 sets the following limits on temperatures of non-functional hot surfaces

Table Z101 — Temperature rise limits for touchable surfaces

Surface [d]	*Temperature rise* *K*
	Surfaces of appliances likely to be touched [a b]
Bare metal	*45*
Coated metal [e]	*55*
Glass and ceramic	*60*
Plastic and plastic coating > 0,3 mm [c]	*65*

[a] In addition to surfaces described in 11.Z101 to 11.Z105 the following surfaces or elements shall not be taken into consideration:

- hot functional surface: surface which is intentionally heated by an internal heat source and which has to be hot to carry out the function for which the equipment is intended to be used;
- handles or control knobs including keypads, keyboards and the like are covered by 11.8 of Part 1;
- surfaces of heated cavities or surfaces adjacent to the functional areas and which have the same thermal properties.

[b] When, due to the construction or dimensional limitations of the appliance, the required values cannot be met, the maximum temperature rise shall not be higher than twice the values indicated. In such cases, a warning shall be marked on the relevant surface of the appliance.

[c] The temperature rise limit applies also for plastic material having a metal finish of thickness less than 0,1 mm.

[d] When the thickness of the plastic coating does not exceed 0,3 mm, the temperature rise limits of the coated metal or of glass and ceramic material apply.

[e] Metal is considered coated when a coating having a minimum thickness of 80 µm made by enamel or non substantially plastic coating is used.

The limits are set, with the following exceptions:
Many large areas are exempted for measuring, including

- Areas on and at the edge of oven doors
- Around ventilation holes, areas with a radius of 25 mm are exempted from measuring
- Areas 25 mm from heat functional surfaces

As a rule, the temperatures in the table are taken from Guide 29, but TC 61 (managing the standards for household appliance) has by remarks in the definitions chosen to leave out children less than 8 years and very sickly persons from the standard as they are considered to be persons who cannot operate the products. It is not taken into account in the standard that you might be able to touch the product even without operating it. This is why TC 61 uses contact times of 1.5 sec. instead of 4 sec. as specified according to Guide 29 for products placed more than 85 cm above the floor, and contact times of 4 sec. instead of 15 sec. for products placed less than 85 cm above the floor. (However, no products are in the scope of /2-9, which are intended for use less than 85 cm below the floor).
Furthermore, TC 61 has decided to round up the temperature values in the table to the nearest figure divisible by 5.

As a rule, there are no requirements for the use of warning labels on hot surfaces in /A13 if the temperature limits in Table Z101 are not exceeded. It is permitted to double the temperature rise according to the standard if it is not possible to comply with the temperature requirements due to the construction or dimensional limitations. In that case the warning labels should be used on the surfaces on which the limits are not met.

If the warning label is used, it must be placed on the relevant surface. No direct consensus exists between the paragraph 7.1 of the standard and the note b in Table Z101. The warning label shall be designed as described under /2-9.
The temperature limits in /A13 without using warning label are 7– 13° higher than the temperature requirements set in Guide 29.

By using a warning label, the temperature limits can be up to 73° higher than the temperature requirements set in Guide 29.

Comparison of the temperature limits in Guide 29 and the requirements in the various editions of /2-9

	Permitted temperature rise in K at room temp. = 25ºC					
Material	Guide 29	/A12 Top/Door	/A12 Top/door at ovens with max. setting >240ºC	/A12 other surfaces	A13 without warning label	A13 with warning label
Bare Metal	38	85	95	60	45	90
Coated Metal	42	95	105	65	55	110
Ceramics	51	95	105	65	60	120
Plastic	57	105	115	80	65	130

As it appears from the table above, the temperature requirements are significantly higher in the standards than in Guide 29, even if the table values of the Guide 29 correspond to the temperature limits which the persons, who can be assumed to touch the product, can tolerate without being permanently injured after being burned.

6. Status on ongoing Standardisation

More updates of IEC/EN60335-2-9 are currently under preparation. Amendment 1 to IEC 60335-2-9 has been prepared. In that amendment the temperature limits are adapted to the requirements of EN version, only with the following unacceptable deviations:

- No requirements for size and construction in relation to permission of doubling of temperature rise.
- If temperature setting> 240° C is possible, additional temperature rise of 10° is permitted at the top and front.
- Deviations from colours on warning Symbol 5041 of IEC 60417-1 are permitted.

Moreover, 2 almost identical amendments are in the pipeline; the one to the EN 60335-2-9:2003 edition and the other to FprEN 60335-2-9:2009. Both amendments include the following significant modifications:

- In connection with the specification of permission for the double temperature rise, it is not required that warning labels are placed on the relevant surface

- A secretary note, specifying temperature setting in relation to testing, is added.

The IEC maintenance team (IEC/TC61/MT4) has drawn up a Guideline which they want to be used in connection with the introduction of temperature limits to other 60335-2-xx standards. The document was discussed at the IEC TC 61 meeting in October 2011 and MT 4 deals with comments and adjusts the document after which MT 4 intends to incorporate it when updating of the other safety standards in the 60335-series takes place.

7. The project approach

It was up to the individual participating state to select the products within the given product categories. The only aim of coordination was that the division among each product type should be relatively equal.

Despite the fact that there has not been any official coordination, only 5 products have been selected twice.

There may be other apparently identical products investigated by different member states, but since they have been placed on the market under different brand names, they have been counted as different products.

With the usage of the standardized reporting Excel spreadsheet it has been attempted that the test data for the report is managed equally, but as the test is carried out by various test laboratories, there might obviously be differences between the assessments made and thus between the received test data.

In particular, deviations have appeared in the following areas:

- Number of measuring points
- Location of measuring points
- Assessment of how the area of the product, where the measuring point is located, shall be classified
- Processing of data from the Declaration of Conformity
    - Identification of the date of Declaration of Conformity
    - Identification of the date of placing on the market
    - Identification of which standards the product is declared to conform with

In general, the photos, inserted into the returned Excel sheets are very explanatory and are good supplement to the submitted data.

7.1 Processing of collected Data

As the amount of data for the products varies a lot from member state to member state, it has been necessary to evaluate the test data for each product before they have been collected in relation to preparation of this report.

7.1.1 Thermometry

The measured temperatures - being part of the report in relation to entry in the reporting sheet - were assessed against the applicable temperature limits in /A12, /A13 and Guide 29, and already during entry in the Excel sheet it was obvious which temperature limits had been exceeded. Exceeding from 1-10° has been registered with yellow colour code and exceeding above 10° has been registered with red colour code in the Excel sheet.
Moreover, the report includes measurement data from areas of the product which according to the standard shall be exempted from measuring. In the Excel sheet these results are stated as N/M (No Measurements).

N/M also includes the concept PNS (Product not specified) which has originated from the fact that the toaster as a category is not stated in A12; omission or not. There are divided opinions on this detail, but from the part of the coordinating authority it has been decided that in order to avoid misunderstandings, we have tried to exempt toasters from temperature measurements in some areas.

In this report, the measured temperature exceeding's have been classified according to the amount of the exceeding.

7.1.2 Processing of incoming Data in connection with Document Control

Information about CE marking, test reports and information about the Declaration of Conformity have been taken directly from the reporting sheet. Unfortunately, information about date of marketing, data for issuance of Declaration of Conformity and which editions of the standard the product are declared to conform with are often missing.

With regard to the warning label, an assessment has been made on the basis of the photos being part of the reporting sheet compared with the specification for the symbol.

	IEC 417, No 5041 Background colour- yellow, symbol and outline - black	Caution, hot surface Colour requirements do not apply to markings on equipment if the symbol is moulded or engraved to a depth or raised height of 0,5 mm, or that the symbol and outline are contrasting in colour with the background.

The assessment has resulted in the division into 3 groups:

No warning label on the product = if no visible warning has been on any of the photos being part of the reporting sheet.

Warning label OK = if warning text is OK or symbol 5041 is consistent with specification.

Warning label with remarks= If warning label deviates from specification for symbol 5041

The warning label for hot surfaces

Figure 2 Correct warning label

Non-compliant warning labels.

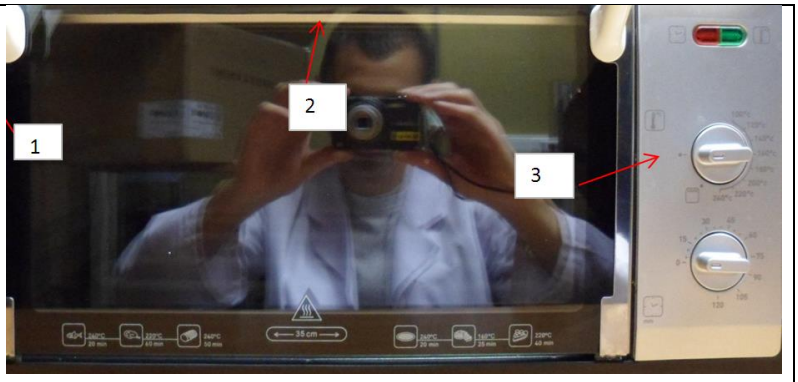


Figure 3 warning labels not in compliance with the standard.

8.0 Breakdown of the report in product types

The report is divided in sections containing the results for each individual product types. The report has also a section in the beginning, containing the overall results for all product types.

8.1 Data basis

11 member states have contributed to the report with test data for 196 products; (191 of these are unique).
The division of products selected for the project by the participating states is the following:

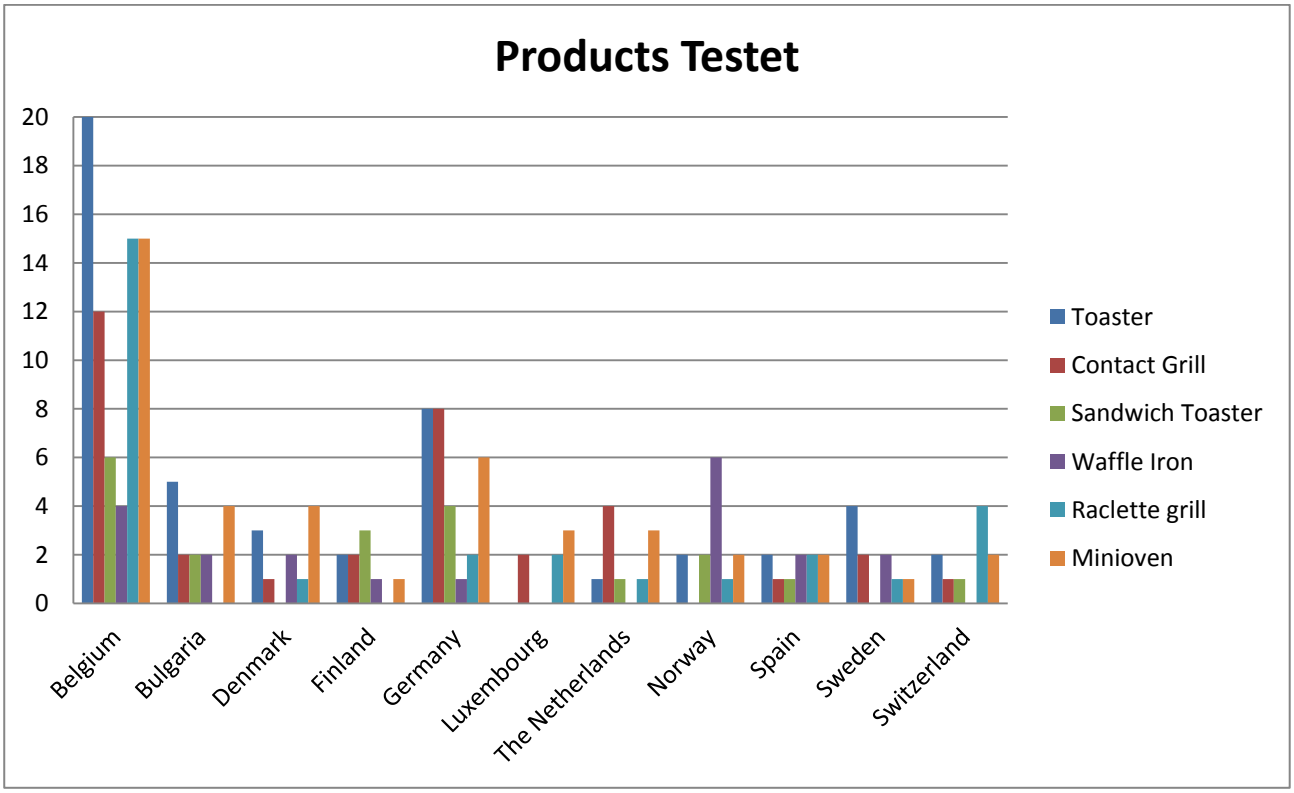


Figure 4 Products tested - by countries

Division on product types

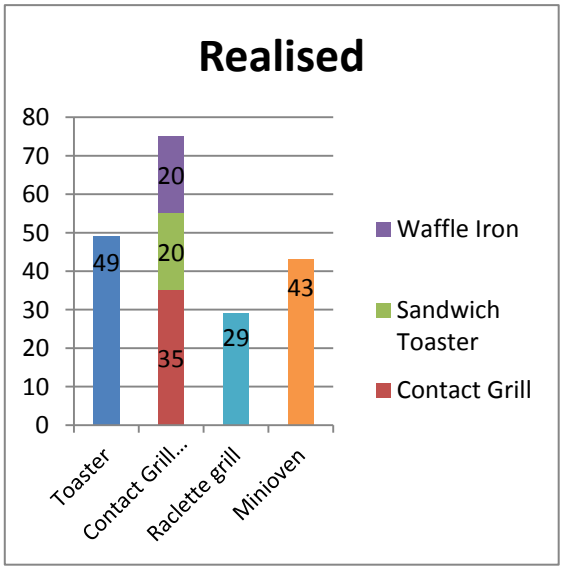


Figure 3 Number of products tested

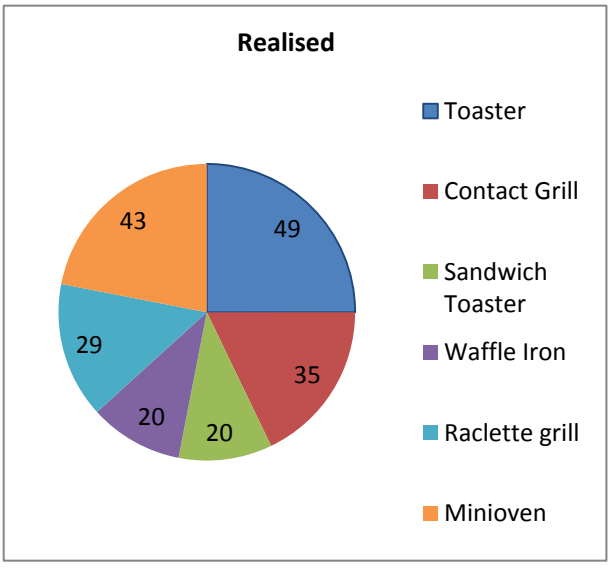


Figure 2 Number of products tested

8.1.1 Test of all Products

196 different products have been tested.

191 (97.4%) of these are equipped with CE-mark.

Declaration of Conformity (DoC) has been received for 106 products (54.1%).

The results for the Use of warning labels are depicted in Fig. 7.

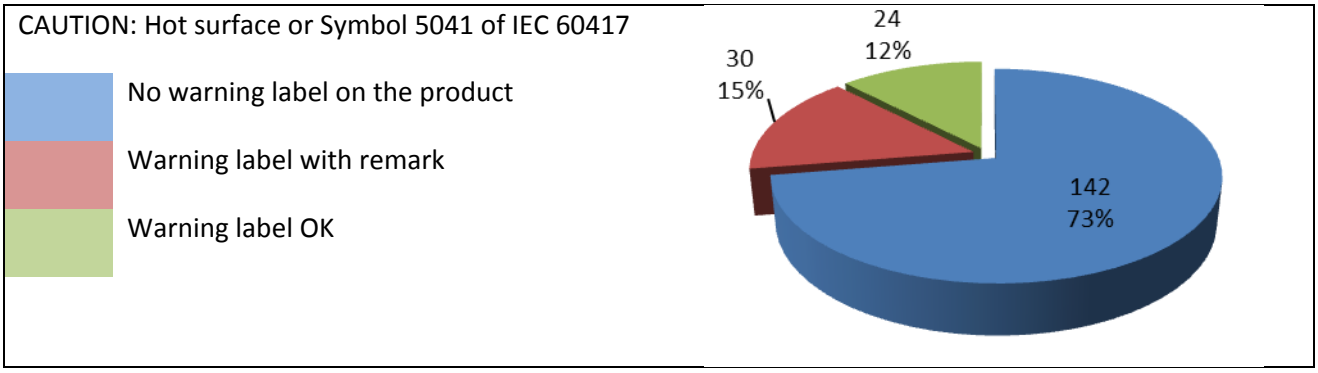


Figure 7 Warning labels - all products

Despite the clear requirements for warning labels on the product according to A13 by double temperature rise, use of acceptable warning label on the products is limited to 12,2%.

Assessment of temperature rise – All products

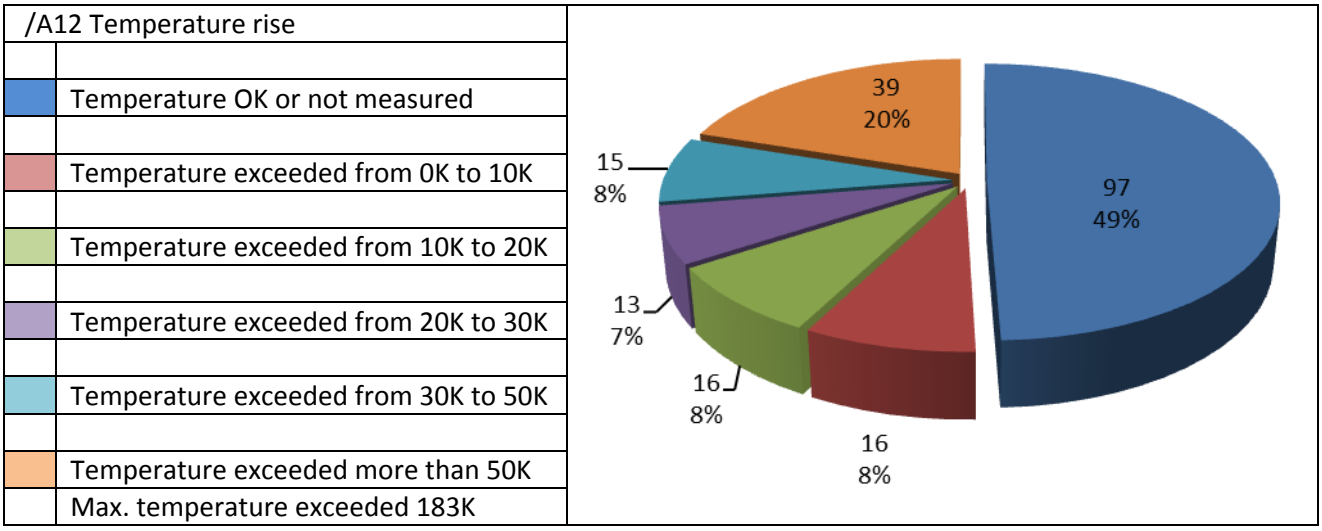


Figure 8 /A12 - all products

/A13 Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 193K

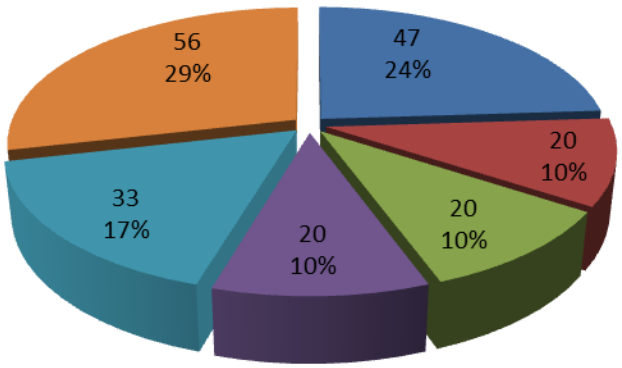


Figure 9 /A13 - all products

/A13 Double temperature allowed Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 193K

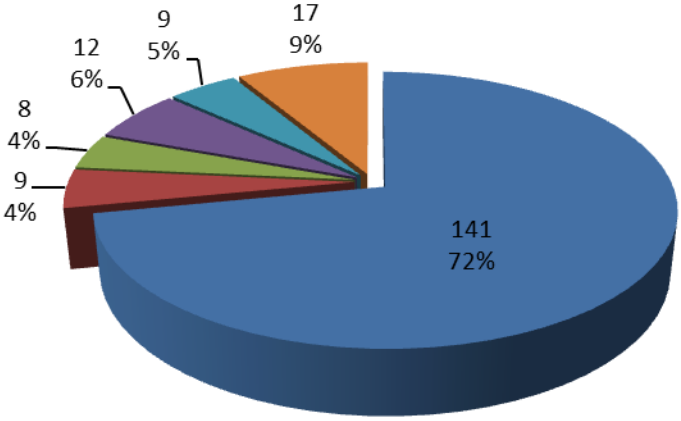


Figure 10 /A13 (Double temperature allowed) - all products

/Guide 29 Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 204K

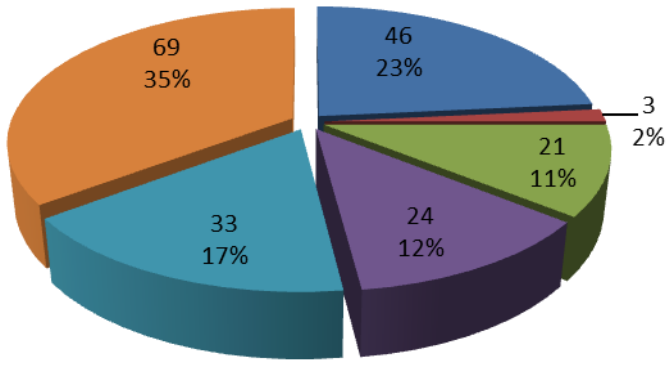


Figure 11 /Guide 29 - all products

Areas where the standard has required exclusion of measurement (NM)	
	Temperature OK or not measured
	Temperature exceeded from 0K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded from 50K to 70K
	Temperature exceeded from 70K to 100K
	Temperature exceeded more than 100K
	Max. measured temperature rise NM 400K

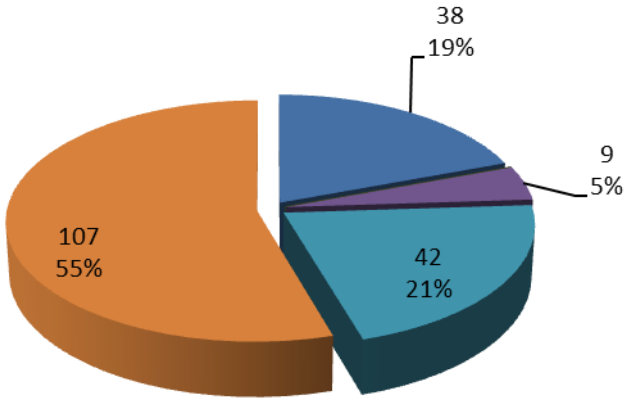


Figure 12 “No Measurement” - all products

	Requirement for warning label on the product (CAUTION: Hot surface or Symbol 5041 of IEC 60417)	Total	%
Products only in conformity with /A12	NO	0	0.0%
Products only in conformity with /A12 except possible requirements for warning labels	YES	0	0.0%
Products only in conformity with /A13	NO	0	0.0%
Products with warning label and only in conformity with /A13 double temperature rise allowed	YES	8	4.1%
Products that except requirements for warning label and only in conformity with /A13 double temperature rise allowed	YES	35	17.9%
Products not OK	NO	60	30.6%
Products only in conformity with /Guide 29 if the standard's requirements for exemption of areas for measuring is NOT accepted	NO	0	0.0%
Products only in conformity with /Guide 29 if the standard's requirements for exemption of areas for measuring is NOT accepted	NO	0	0.0%
Products in conformity with /Guide 29 +/A12+/A13 except from possible requirements for warning label if the standard's requirements for exemption of areas for measuring is NOT accepted		32	16.3%
Products in conformity with /Guide 29 + /A12+/A13except from possible requirements for warning label if the standard's requirements for exemption of areas for measuring is NOT accepted		13	6.6%
Products with warning label and this in conformity with both /A12 & /A13 double temperature rise allowed	YES	4	2.0%
Products that except requirements for warning labels are in conformity with both /A12 & /A13 double temperature rise allowed	YES	42	21.4%
Products in conformity with both /A12 & /A13		1	0.5%
Products that except possible requirements for warning labels are in conformity with both /A12 & /A13	YES	1	0.5%
Total		196	100.0%

Products Declared in conformity with /A12

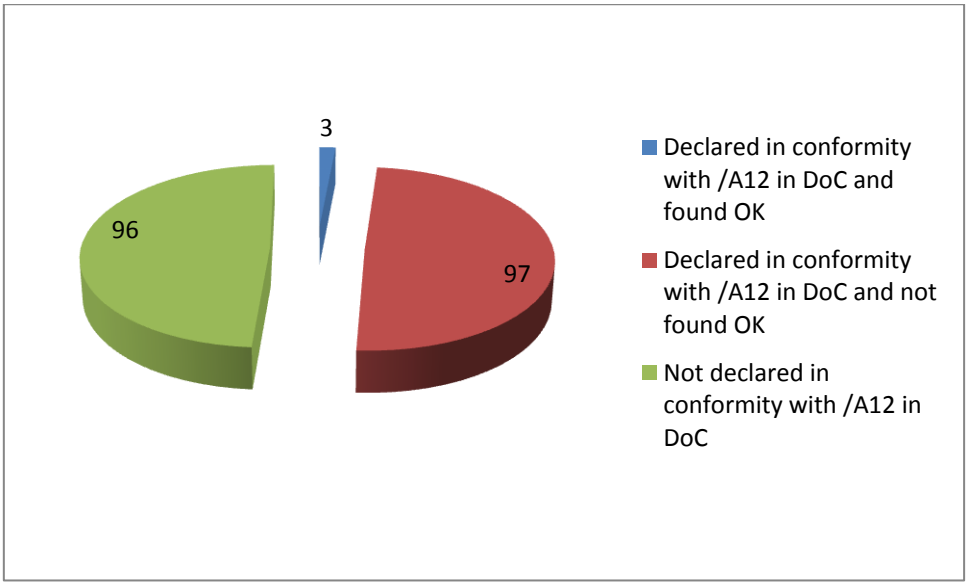


Figure 13 All products declared in conformity with /A12

Products Declared in conformity with /A13

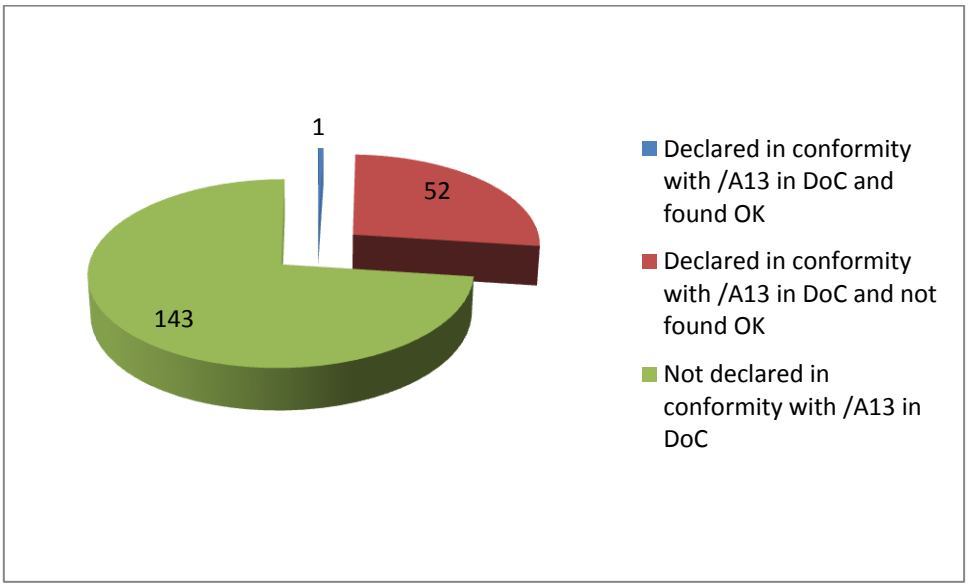


Figure 14 all products, declared in conformity with A/13

8.1.2 Test of Contact grill, sandwich toaster, waffle iron

76 Contact grills have been tested.

76 (100%) of these are equipped with CE-mark.

Declaration of Conformity (DoC) has been received for 42 (55.3%).

The results for the usage of warning labels are depicted in Fig. 15.

CAUTION: Hot surface or Symbol 5041 of IEC 60417	
	No warning label on the product
	Warning label with remark
	Warning label OK

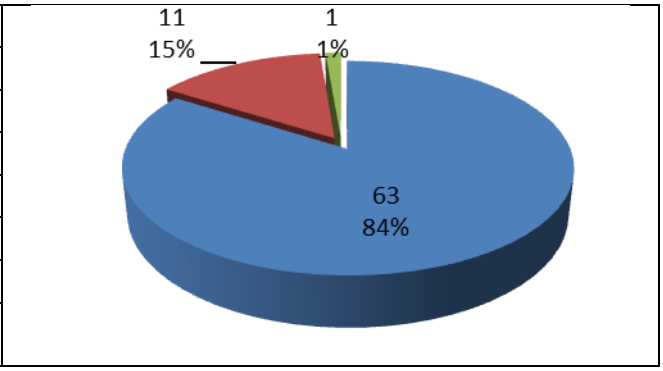


Figure 15 Warning labels Contact grill, sandwich toaster, waffle iron

Despite the clear requirements for warning labels on the product according to A13 by double temperature rise, use of acceptable warning label on the products is limited to 1,3%.

Assessment of temperature rise for Contact grill, sandwich toaster and waffle iron

/A12 Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 183K

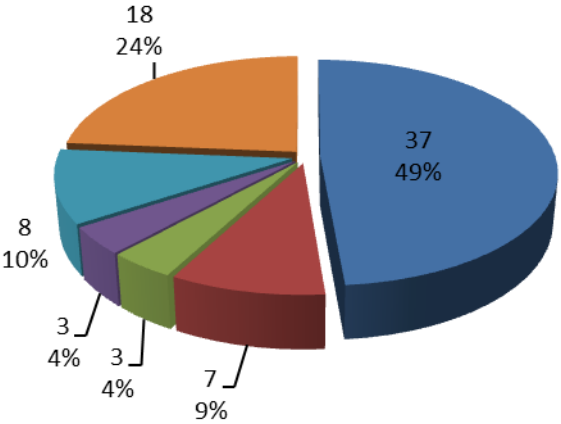


Figure 16 /A12 Contact grill, sandwich toaster, waffle iron

/A13 Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 193K

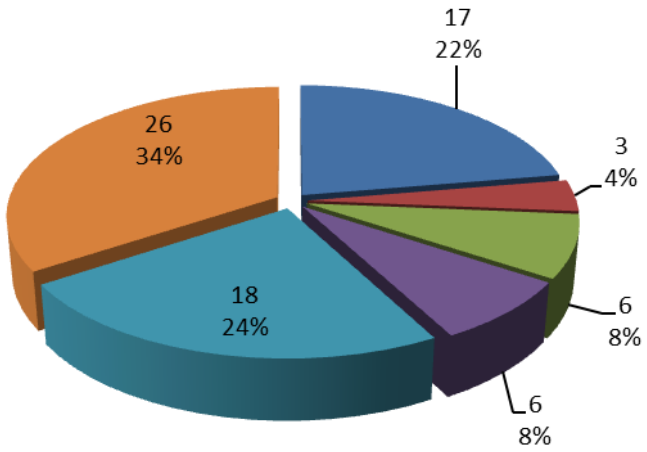


Figure 17 /A13 Contact grill, sandwich toaster, waffle iron

/A13 Double temperature allowed Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 138K

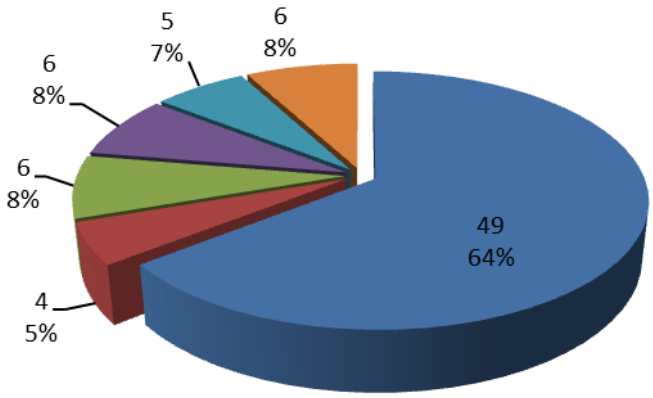


Figure 18 /A13 (Double temperature allowed) Contact grill, sandwich toaster, waffle iron

/Guide 29 Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 204K

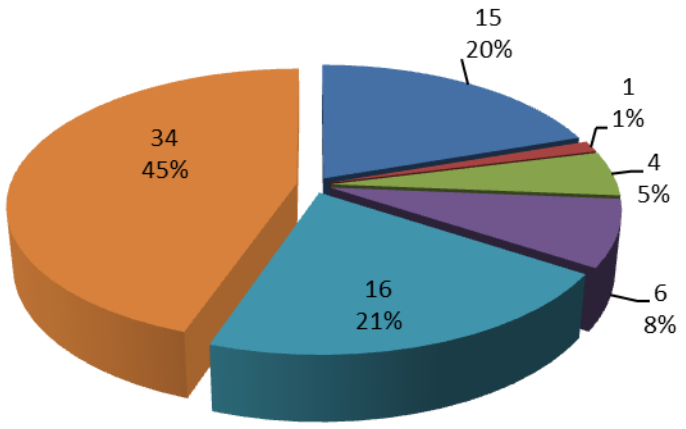


Figure 19 /Guide 29, Contact grill, sandwich toaster, waffle iron

Areas where the standard has required exclusion of measurement (NM)	
	Temperature OK or not measured
	Temperature exceeded from 0K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded from 50K to 70K
	Temperature exceeded from 70K to 100K
	Temperature exceeded more than 100K
	Max. measured temperature rise NM 241K

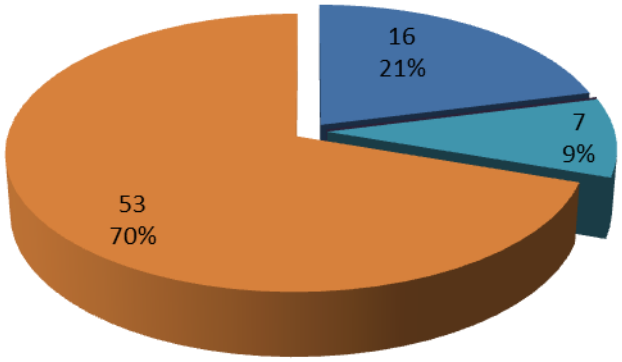


Figure 20 “No Measurement” Contact grill, sandwich toaster, and waffle iron

	Requirement for warning label on the product (CAUTION: Hot surface or Symbol 5041 of IEC 60417)	Total	%
Products only in conformity with /A12	NO	0	0,0%
Products only in conformity with /A12 except possible requirements for warning labels	NO	0	0,0%
Products only in conformity with /A13	NO	0	0,0%
Products with warning label and only in conformity with /A13 double temperature rise allowed	YES	0	0,0%
Products that except requirements for warning label and only in conformity with /A13 double temperature rise allowed	YES	12	15,8%
Products not OK	NO	27	35,5%
Products only in conformity with Guide 29 if the standard's requirements for exemption of areas for measuring is NOT accepted	NO	0	0,0%
Products only in conformity with Guide 29 if the standard's requirements for exemption of areas for measuring is NOT accepted	NO	0	0,0%
Products in conformity with Guide 29 +/A12+/A13 except from possible requirements for warning label if the standard's requirements for exemption of areas for measuring is NOT accepted	NO	15	19,7%
Products in conformity with Guide 29 + /A12+/A13 except from possible requirements for warning label if the standard's requirements for exemption of areas for measuring is NOT accepted	NO	1	1,3%
Products with warning label and this in conformity with both /A12 & /A13 double temperature rise allowed	YES	0	0,0%
Products that except requirements for warning labels are in conformity with both /A12 & /A13 double temperature rise allowed	YES	20	26,3%
Products in conformity with both /A12 & /A13	NO	0	0,0%
Products that except possible requirements for warning labels are in conformity with both /A12 & /A13	NO	1	1,3%
Total		76	100,0%

Contact grill, sandwich toaster, waffle iron Declared in conformity with /A12

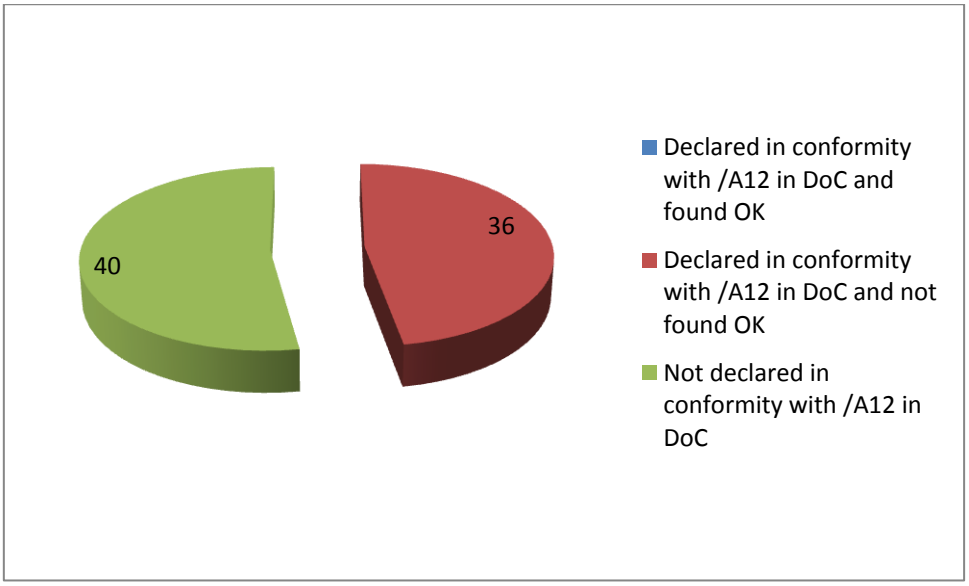


Figure 21 Conformity with /A12 Contact grill, sandwich toaster, waffle iron

Contact grill, sandwich toaster, waffle iron Declared in conformity with /A13

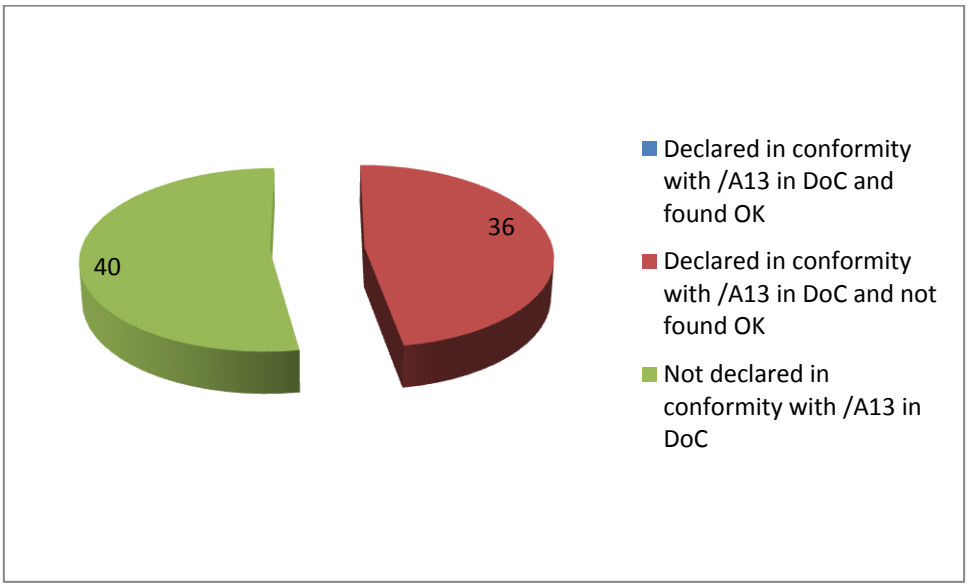


Figure 22 Conformity with /A13 Contact grill, sandwich toaster, waffle iron

8.1.3 Test of Toasters

49 Toasters have been tested.

48 (98%) of these are equipped with CE-mark.

Declaration of Conformity (DoC) has been received for 27 (55.1%) toasters.

The results for the usage of warning labels are depicted in Fig. 23.

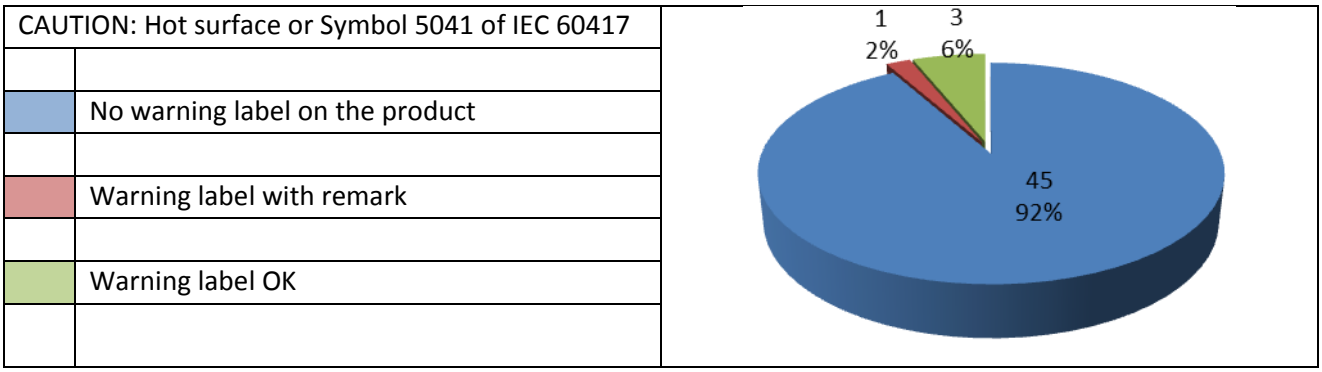
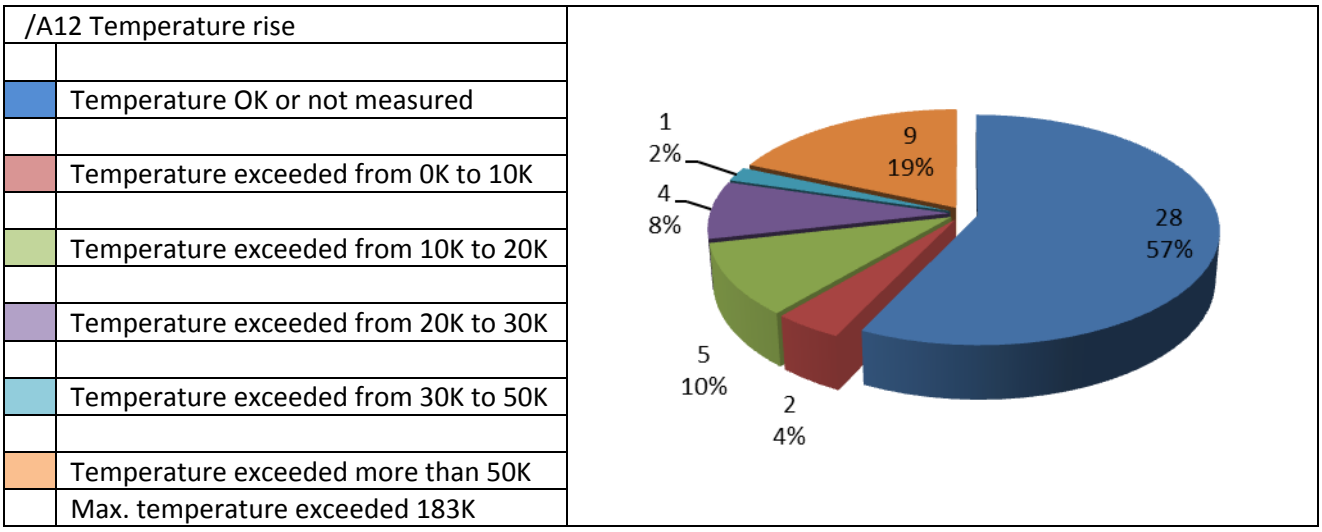


Figure 23 Warning labels Toasters

Despite the clear requirements for warning labels on the product according to A13 by double temperature rise, use of acceptable warning label on the products is limited to 6,1%.

Assessment of temperature rise for Toasters



Figur 24 /A12 Toasters

/A13 Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 169K

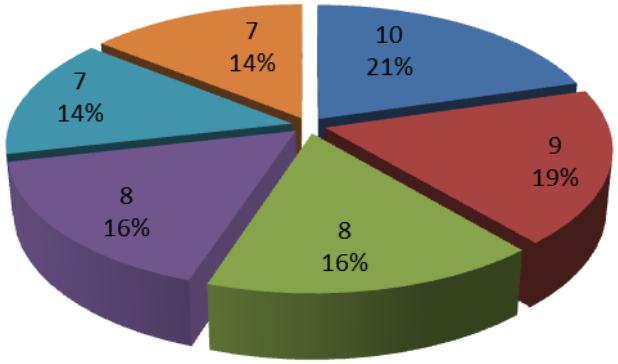


Figure 25 /A13 Toasters

/A13 Double temperature allowed Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 124K

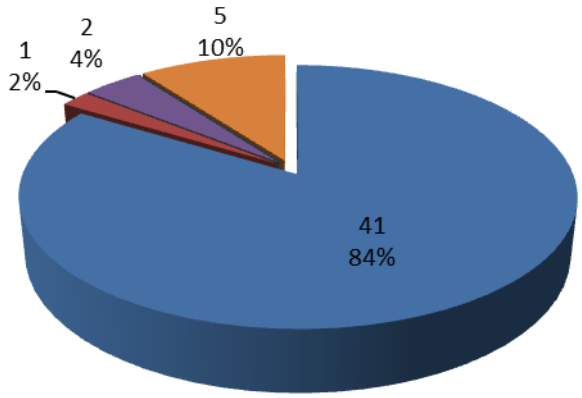


Figure 26 /A13 (Double temperature allowed) Toaster

/Guide 29 Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 176K

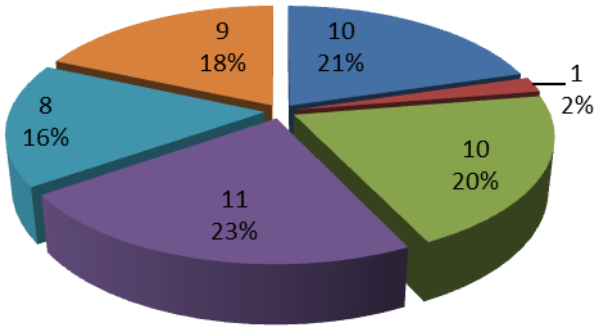


Figure 27 /Guide 29 Toasters

Areas where the standard has required exclusion of measurement (NM)	
	Temperature OK or not measured
	Temperature exceeded from 0K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded from 50K to 70K
	Temperature exceeded from 70K to 100K
	Temperature exceeded more than 100K
	Max. measured temperature rise NM 400K

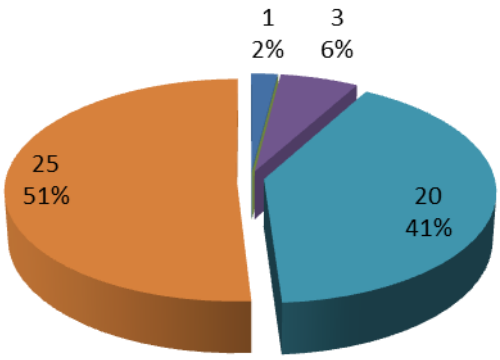


Figure 28 "No Measurement" Toasters

	Requirement for warning label on the product (CAUTION: Hot surface or Symbol 5041 of IEC 60417)	Total	%
Products only in conformity with A/12	NO	0	0,0%
Products only in conformity with /A12 except possible requirements for warning labels	NO	0	0,0%
Products only in conformity with /A13	NO	0	0,0%
Products with warning label and only in conformity with /A13 double temperature rise allowed	YES	1	2,0%
Products that except requirements for warning label and only in conformity with /A13 double temperature rise allowed	YES	12	24,5%
Products not OK	NO	8	16,3%
Products only in conformity with Guide 29 if the standard's requirements for exemption of areas for measuring is NOT accepted	NO	0	0,0%
Products only in conformity with Guide 29 if the standard's requirements for exemption of areas for measuring is NOT accepted	NO	0	0,0%
Products in conformity with Guide 29 +/A12+/A13 except from possible requirements for warning label if the standard's requirements for exemption of areas for measuring is NOT accepted	NO	10	20,4%
Products in conformity with Guide 29 + /A12+/A13 except from possible requirements for warning label if the standard's requirements for exemption of areas for measuring is NOT accepted	NO	0	0,0%
Products with warning label and this in conformity with both /A12 & /A13 double temperature rise allowed	YES	1	2,0%
Products that except requirements for warning labels are in conformity with both /A12 & /A13 double temperature rise allowed	YES	17	34,7%
Products in conformity with both /A12 & /A13	NO	0	0,0%
Products that except possible requirements for warning labels are in conformity with both /A12 & /A13	NO	0	0,0%
Total		49	100,0%

Toasters Declared in conformity with /A12

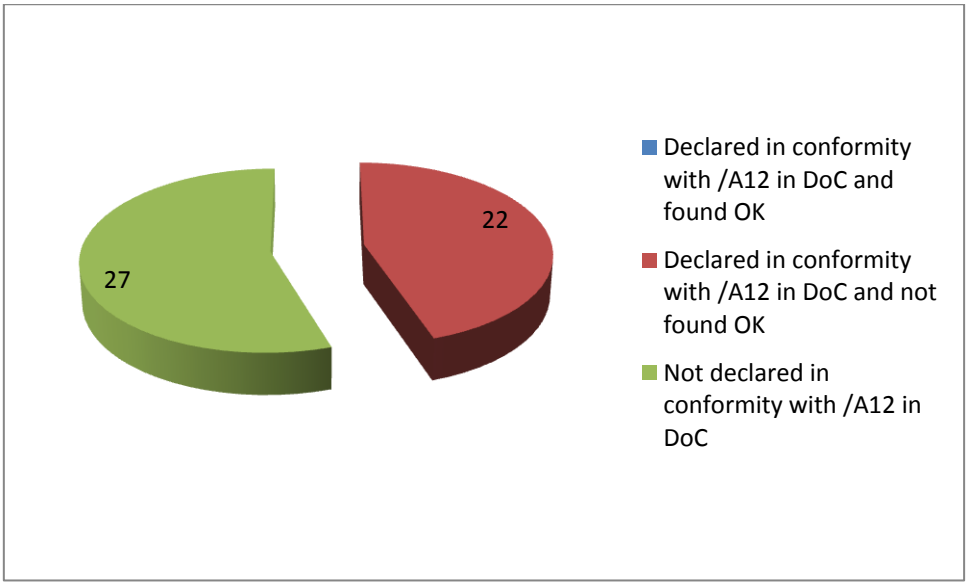


Figure 29 Toasters declared in conformity with /A12

Toasters declared in conformity with /A13

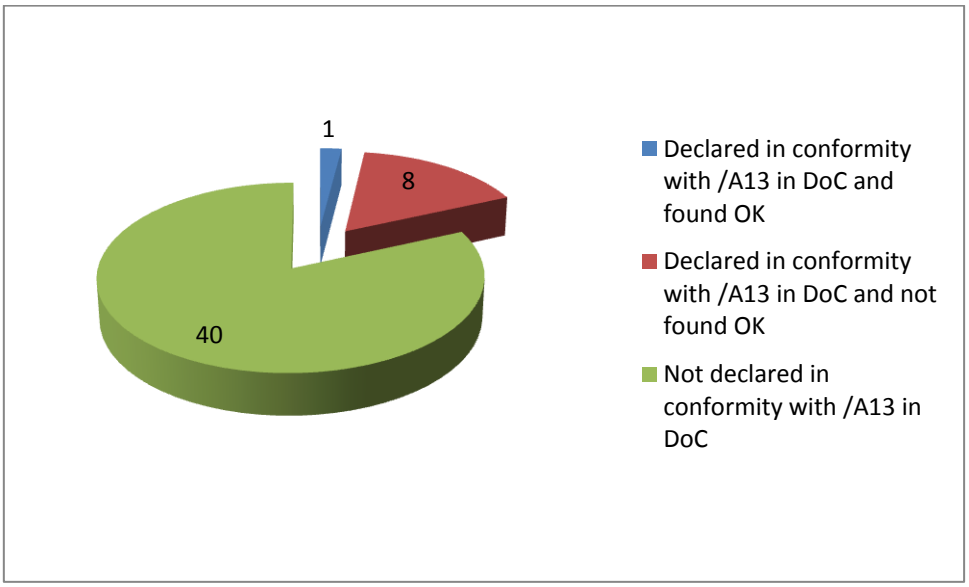


Figure 30 Toasters declared in conformity with /A13

8.1.4 Test of Raclettes

28 Raclette have been tested.

27 (96.4%) of these are equipped with CE-mark.

Declaration of Conformity (DoC) has been received for 14 (50%).

The results for the usage of warning labels are depicted in Fig. 31.

CAUTION: Hot surface or Symbol 5041 of IEC 60417	
	No warning label on the product
	Warning label with remark
	Warning label OK

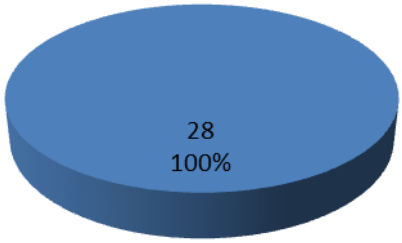


Figure 31 Warning labels Raclettes

Despite the clear requirements for warning labels on the product according to A13 by double temperature rise, use of acceptable warning label on the products is limited to 0%.

Assessment of temperature rise for Raclettes

/A12 Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 108K

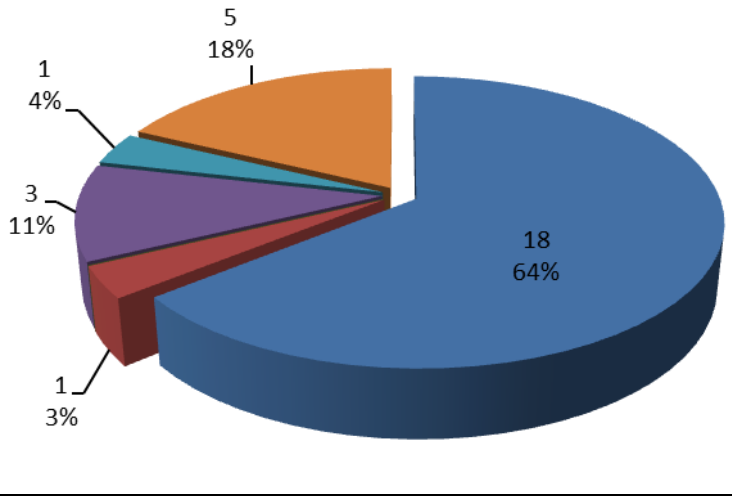


Figure 32 /A12 Raclettes

/A13 Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 121K

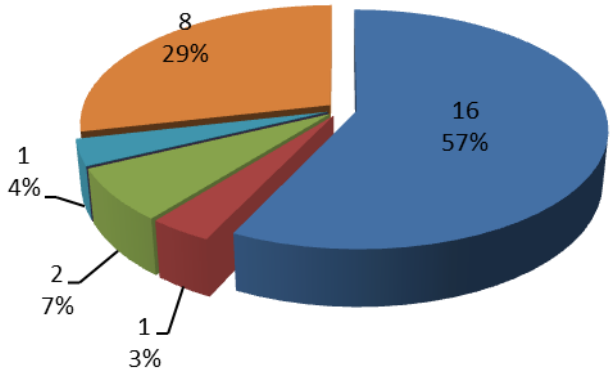


Figure 33 /A13 Raclettes

/A13 Double temperature allowed Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 131K

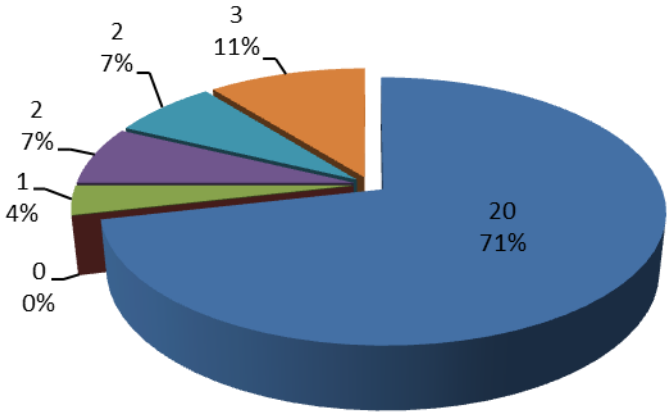


Figure 34 /A13 (Double temperature allowed) Raclettes

/Guide 29 Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 130K

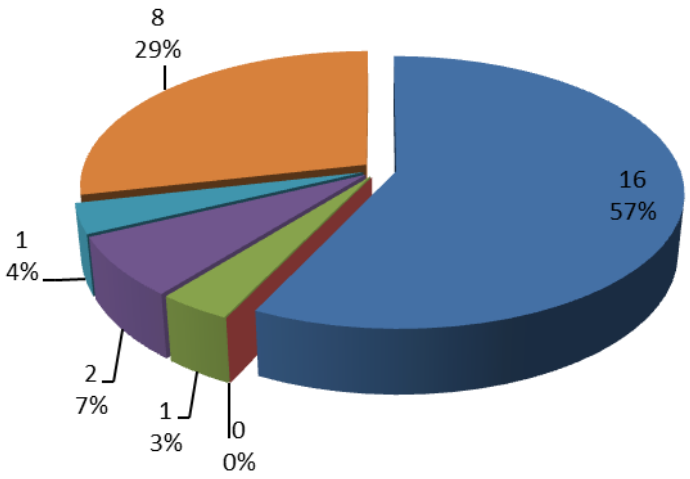


Figure 35 /Guide 29 Raclettes

Areas where the standard has required exclusion of measurement (NM)	
	Temperature OK or not measured
	Temperature exceeded from 0K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded from 50K to 70K
	Temperature exceeded from 70K to 100K
	Temperature exceeded more than 100K
	Max. measured temperature rise NM 207K

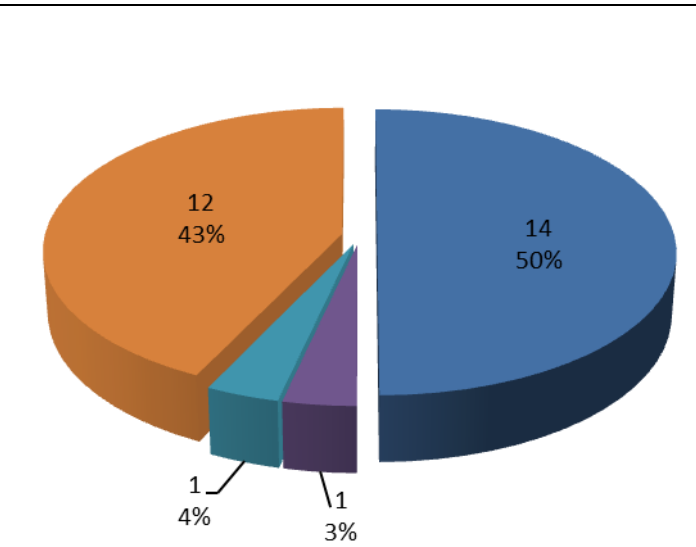


Figure 36 "No Measurements" Raclettes

	Requirement for warning label on the product (CAUTION: Hot surface or Symbol 5041 of IEC 60417)	Total	%
Products only in conformity with A/12	NO	0	0,0%
Products only in conformity with /A12 except possible requirements for warning labels	NO	0	0,0%
Products only in conformity with /A13	NO	0	0,0%
Products with warning label and only in conformity with A713 double temperature rise allowed	YES	0	0,0%
Products that except requirements for warning label and only in conformity with /A13 double temperature rise allowed	YES	2	7,1%
Products not OK	NO	8	28,6%
Products only in conformity with Guide 29 if the standard's requirements for exemption of areas for measuring is NOT accepted	NO	0	0,0%
Products only in conformity with Guide 29 if the standard's requirements for exemption of areas for measuring is NOT accepted	NO	0	0,0%
Products in conformity with Guide 29 +/A12+/A13 except from possible requirements for warning label if the standard's requirements for exemption of areas for measuring is NOT accepted	NO	4	14,3%
Products in conformity with Guide 29 + /A12+/A13 except from possible requirements for warning label if the standard's requirements for exemption of areas for measuring is NOT accepted	NO	12	42,9%
Products with warning label and this in conformity with both /A12 & /A13 double temperature rise allowed	YES	0	0,0%
Products that except requirements for warning labels are in conformity with both /A12 & /A13 double temperature rise allowed	YES	2	7,1%
Products in conformity with both /A12 & /A13	NO	0	0,0%
Products that except possible requirements for warning labels are in conformity with both /A12 & /A13	NO	0	0,0%
Total		28	100,0%

Raclettes declared in conformity with /A12

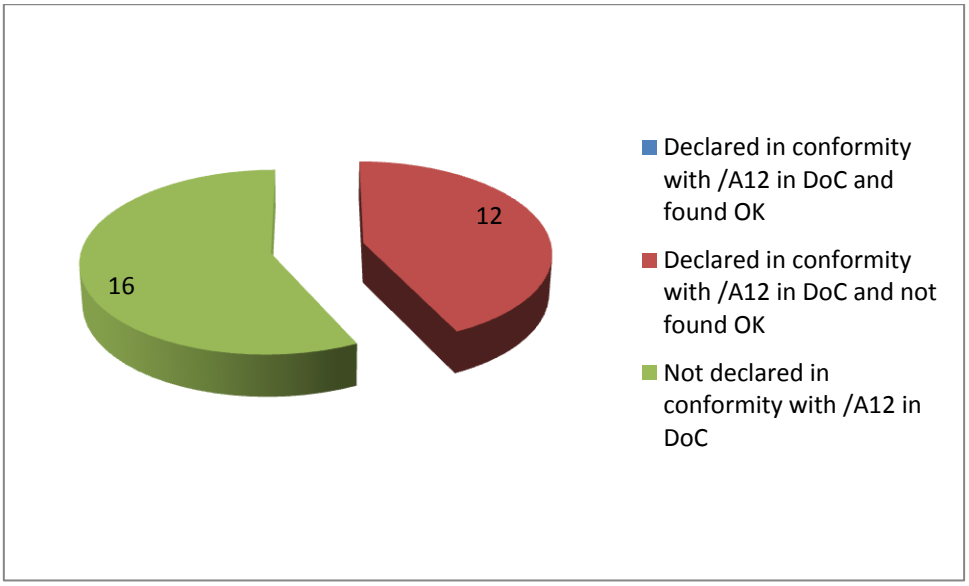


Figure 37 Raclettes declared in conformity with /A12

Raclettes declared in conformity with /A13

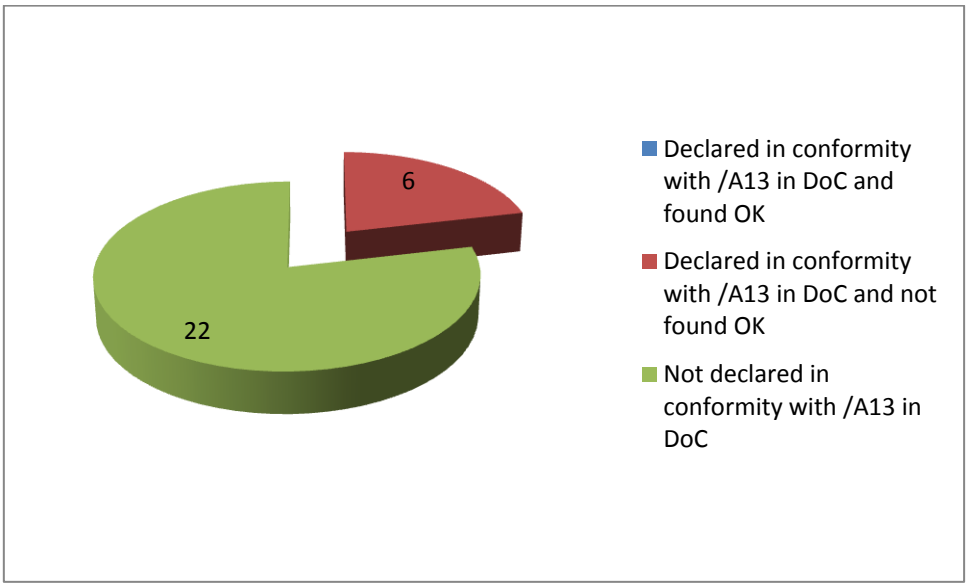


Figure 38 Raclettes declared in conformity with /A13

8.1.5 Test of Mini ovens

43 Mini ovens have been tested.

40 (93%) of these are equipped with CE-mark.

Declaration of Conformity (DoC) has been received for 23 (53.5%) mini ovens.

The results for the usage of warning labels are depicted in Fig. 39.

CAUTION: Hot surface or Symbol 5041 of IEC 60417	
	No warning label on the product
	Warning label with remark
	Warning label OK

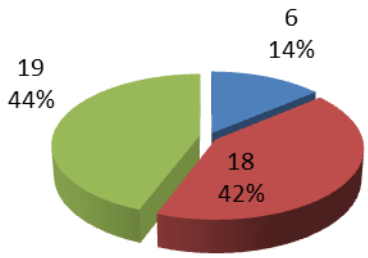


Figure 39 Warning labels Mini ovens

Despite the clear requirements for warning labels on the product according to /A12 and /A13 by double temperature rise, use of acceptable warning label on the products is limited to 44%.

Assessment of temperature rise for Mini ovens

/A12 Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 99K

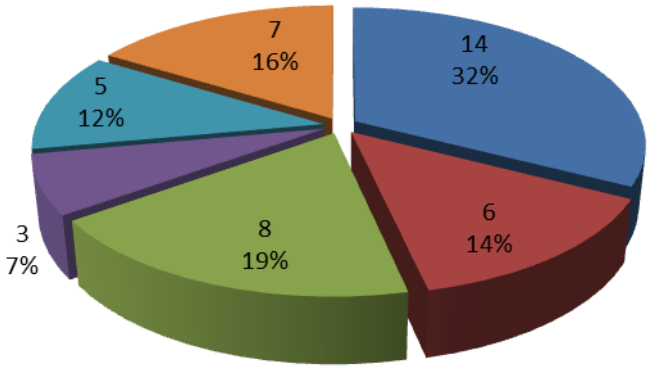


Figure 40 /A12 Mini ovens

/A13 Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 134K

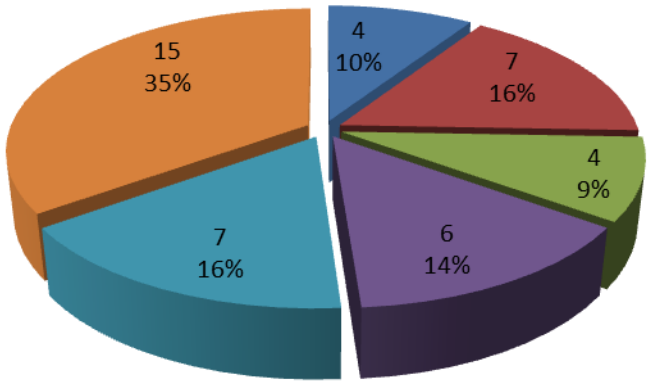


Figure 41 /A13 Mini ovens

/A13 Double temperature allowed Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 74K

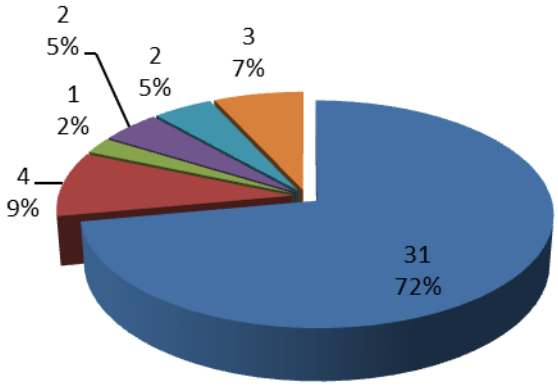


Figure 42 /A13 (Double temperature allowed) Mini ovens

/Guide 29 Temperature rise	
	Temperature OK or not measured
	Temperature exceeded from 0K to 10K
	Temperature exceeded from 10K to 20K
	Temperature exceeded from 20K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded more than 50K
	Max. temperature exceeded 143K

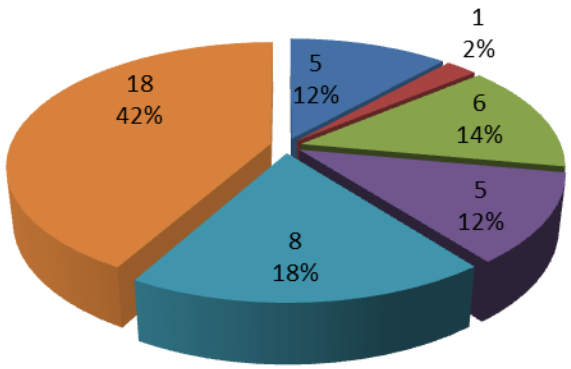


Figure 43 /Guide 29 Mini ovens

Areas where the standard has required exclusion of measurement (NM)	
	Temperature OK or not measured
	Temperature exceeded from 0K to 30K
	Temperature exceeded from 30K to 50K
	Temperature exceeded from 50K to 70K
	Temperature exceeded from 70K to 100K
	Temperature exceeded more than 100K
	Max. measured temperature rise NM 175K

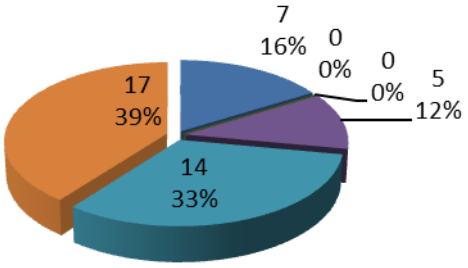


Figure 44 "No Measurements" Mini ovens

	Requirement for warning label on the product (CAUTION: Hot surface or Symbol 5041 of IEC 60417)	Total	%
Products only in conformity with A/12	YES	0	0.0%
Products only in conformity with /A12 except possible requirements for warning labels	YES	0	0.0%
Products only in conformity with /A13	NO	0	0.0%
Products with warning label and only in conformity with /A13 double temperature rise allowed	YES	7	16.3%
Products that except requirements for warning label and only in conformity with /A13 double temperature rise allowed	YES	9	20.9%
Products not OK	NO	17	39.5%
Products only in conformity with Guide 29 if the standard's requirements for exemption of areas for measuring are NOT accepted	NO	0	0.0%
Products only in conformity with Guide 29 if the standard's requirements for exemption of areas for measuring are NOT accepted	NO	0	0.0%
Products in conformity with Guide 29 +/A12+/A13 except from possible requirements for warning label if the standard's requirements for exemption of areas for measuring are NOT accepted	YES	3	7.0%
Products in conformity with Guide 29 + /A12+/A13 except from possible requirements for warning label if the standard's requirements for exemption of areas for measuring are NOT accepted	YES	0	0.0%
Products with warning label and in conformity with both /A12 & /A13 double temperature rise allowed	YES	3	7.0%
Products that except requirements for warning labels are in conformity with both /A12 & /A13 double temperature rise allowed	YES	3	7.0%
Products in conformity with both /A12 & /A13	YES	1	2.3%
Products that except possible requirements for warning labels are in conformity with both /A12 & /A13	YES	0	0.0%
Total		43	100.0%

Mini ovens declared in conformity with /A12

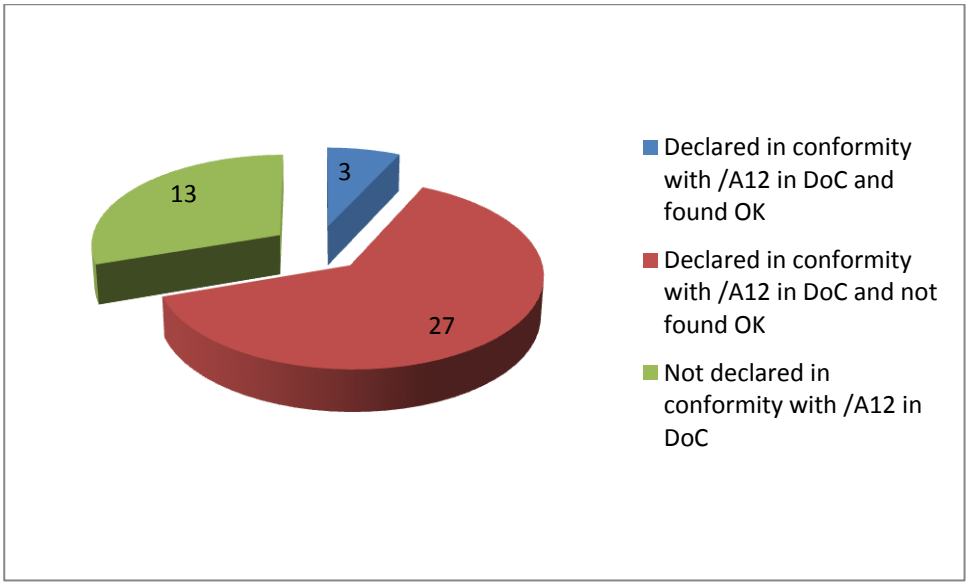


Figure 45 Mini ovens declared in conformity with /A12

Mini ovens declared in conformity with /A13

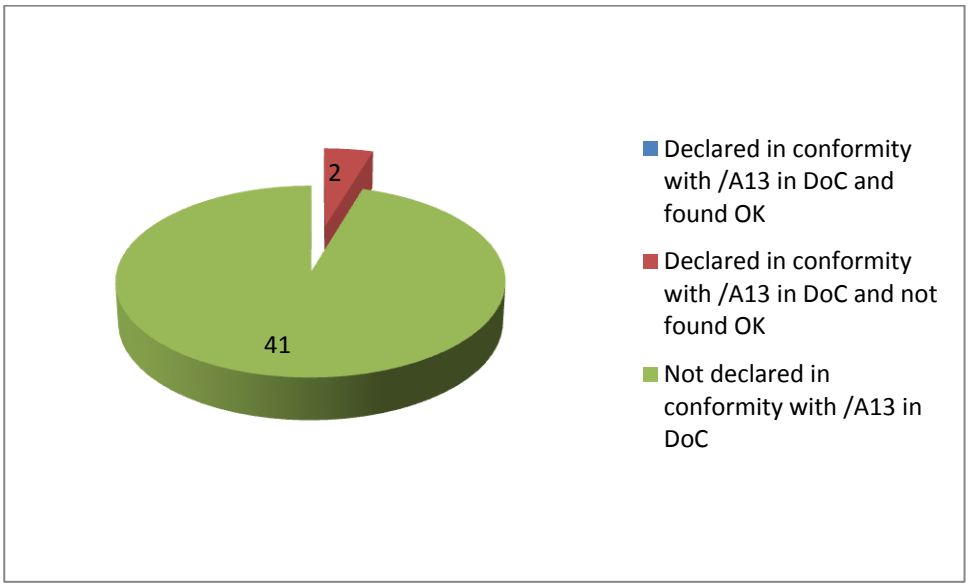


Figure 46 Mini ovens declared in conformity with /A13

9.0 Conclusion

There have been big differences in which documentation the participating member states have been able to procure. Consequently, the documentation available for products has not been consistent. Therefore, it has not been possible to draw an unambiguous conclusion on the documentation.

As an example, only a few of the received reports include information about which standards the product is declared to conform with.

As it appears from sections 8.1.X., the measured temperatures of the non-functional surfaces exceed for most of the products significantly the temperature limits specified under /A12 /A13 and /Guide 29.

The reported temperature problems involve all the product groups. As an example, for contact grills, sandwich toasters and waffle irons the biggest problem is the very high temperatures at the top of the appliances and at the gaps into the functional heating surfaces; quite often it is possible to touch these during operation of the product, but on some of these products, the heating areas (functional areas) are placed so that they, according to the standard, are exempted from measuring.

As far as the toasters are concerned, the hottest areas are around the gaps for the bread, which according to the standard are exempted from measuring.

Very large temperature differences have been measured on these surfaces for different toasters, which show that it is possible through the design to reduce the surface temperature significantly.

On the raclette grills, the highest temperatures have been measured on the areas around the functional surfaces which have been exempted from measuring according to the standard.

Several mini ovens contain large areas with strategically placed vent holes, which mean that large areas of the product are exempted from measuring according to the standard. There are even examples that entire surfaces are filled with vent holes placed at distances of less than 5 cm. This means that the entire surface is exempted from measuring even if temperature rises of 158K could be measured on the surface where the temperature rise limit for minor burns without irreversible damages to the skin is 42K.

From the report's sections concerning the various editions of the standard, it appears clearly that the temperature limits in /A13 double temperature rises are not lower than the temperature limits in /A12.

The measurements also show that the areas of the products, which according to the standard are exempted from measuring, have very high temperatures, and if these areas were not exempted from measuring it would mean that some of the products could not meet the standards.

Follow-up.: As a minimum, the standard should be adjusted as follows:

There should be clear requirements in the standards to limit the area of surfaces, which can be exempted from measuring. Moreover, it is important that the areas, which can be exempted from measuring, are clearly specified in the standard for each product type.

Moreover, it should be required that the areas, which are exempted from measuring, are equipped with permanent warning label CAUTION: Hot surface or Symbol 5041 of IEC 60417, placed in the immediate vicinity of the exempted area.

/A13 also allows doubling the temperature rise on surfaces which due to size and design cannot meet the temperature limits if the product is equipped with a warning label. This formulation is interpreted by someone that if you just put a warning label on a product then it is allowed to double the temperature limits of the entire product.

It is therefore important to change the text of the standard so that it appears that it is allowed to increase the temperature rise only for limited areas of the product and that all surfaces with increased temperatures must be equipped with a warning label placed in the immediate vicinity of the hottest place.

Warning labels must be in accordance with CAUTION: Hot surface or Symbol 5041 of IEC 60417, which shall be a permanent label with black print on yellow background.

If it is necessary to equip the product with a warning label, the risk should be described in the user manual as well.