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Testing conditions for kitchenware articles in contact with foodstuffs: Plastics and Metals

The EURL-FCM harmonised approach series

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Introduction

The European Union Reference Laboratory for Food Contact Materials (EURL-FCM) and the National Reference Laboratories (NRLs) of the network have agreed on a set of test conditions, i.e. contact temperature and contact time, to ensure the comparability of measurement results reported in the frame of the implementation of official controls for FCM (Regulation (EU) 2017/625).

The comprehensive tables included in this **second version** of the kitchenware report replace the relevant sections in JRC's "Guidelines on Testing Conditions for Articles In Contact With Foodstuffs (With a Focus on Kitchenware)" of 2009 (https://europa.eu/!RH66Bd), and the first version of the report published in 2019 (https://europa.eu/!cM98gv).

The test conditions for specific migration from **plastics and plastic containing articles** are based on expert judgement on the "worst case" foreseeable conditions of use by the consumer, followed by the application of the principles of sections 2.1.3 and 2.1.4 of Annex V of Regulation (EU) No 10/2011(#). Section 3.1 of the same Regulation applies to test conditions for overall migration. The shape, form, material and functionality of an article were leading for determining the foreseeable use, in particular in view of how consumers expect to use such articles on the basis of their likely experience. This choice was made based on considerations on how consumers could foreseeably use the article, not on how the producer of the article intended it to be used.

It should be emphasised that, in addition to the general requirements of Article 3 of Regulation (EC) No 1935/2004, no material specific EU legislation exists for **metals and alloys** in contact with food. Therefore national legislation shall apply. In the absence of national legislation, the test conditions presented in these guidelines (based on the test conditions for plastics articles) will apply.

Similarly, the food simulants to be used during the migration test are defined in Regulation (EU) No 10/2011 for plastics and plastic containing articles. In the absence of defined food simulants for metals and alloys at EU level, national legislation shall apply. Member States may use other guidance, such as the practical guideline for manufacturers and regulators on "*Metals and alloys used in food contact materials and articles*" published by the Council of Europe (https://www.edqm.eu/en/publications-food-contact-materials-and-articles).

This guideline recommends also other aspects related to migration testing, such as sample preparation, test type and considerations on the surface-to-volume to be used for the calculation of the final result. The sample preparation concerns advice on cutting the sample or not. The test type relates to testing by immersion (e.g. complete, reverse pouch), filling (e.g. article, pouch), migration cell (flat articles) or by real use (assembled articles).

The test results need to be recalculated based on real surface-to-volume ratio according to Article 17 of the plastic Regulation (EU) No 10/2011. However, some exceptions exist, e.g. for very small or large volume articles (V<500 mL or V>10 L) or for articles for which it is difficult to determine the amount of food that comes into contact with the article. In these cases "6 dm^2 per kg" of food applies. This concept is also valid for metals and alloys. In addition to this concept the Council of Europe developed an alternative approach called the "envelop volume method".

The following approach should be used for selecting the test conditions:

1. The first choice should always be the test conditions that this guideline assigns.
2. However, when this guideline assigns several possible test conditions for the same type of article, the most conservative test condition should be used appropriate for the specific article (which is not necessarily the most severe condition).
3. Where the article, because of its shape or functionality, can only foreseeably be used in a specific way such as in contact with specific foods or time/temperature combinations and would not foreseeably be used otherwise, the assignment of the test condition can be based on that specific use.

4. Similarly, if a label permanently attached to the article, such as by embossing or engraving, is limiting its use or is providing operating instructions, test conditions that are more limited than the conditions assigned by this guidance may be used.
5. Labelling only of the packaging of the kitchenware or tableware article, regarding the way in which its manufacturer intends it to be used, should never be leading for selecting testing conditions, even if the packaging includes pictures and/or instructions and if it would be representative for the way in which the manufacturer intends the article to be used. Such labelling is likely to be discarded together with the packaging and may be forgotten by the consumer or subsequent consumers. In this case and in the case of no labelling the most severe test condition of the different possibilities for that type of article needs to be selected.

Table 1 provides a not exhaustive list of examples of articles clustered in material independent classes and subclasses of kitchen and tableware.

Table 2 and **Table 3** present the relevant test conditions, i.e. contact time and contact temperature, for each class of kitchen articles made of plastics and metals and alloys, respectively. They include food simulants, testing conditions (i) based on the foreseeable worst case conditions of use of the article or (ii) according to the instructions on the label, together with the surface-to-volume (S/V) ratios to be applied when calculating the final migration result. The selection of food simulants is based on the foods expected to be used for a particular subclass. When a plastic subclass can be used in contact with all types of foods, food simulants A, B and D2 are indicated. When a plastic article is used with specific foods only, the relevant food simulants need to be selected according to Annex III of the Regulation (#). For metallic articles the food simulant is selected from national legislation or from the practical guideline for manufacturers and regulators on "Metals and alloys used in food contact materials and articles".

Table 4 describes the rationale behind the selection of specific test conditions (time and temperature) for plastic and metal articles.

Table 5 lists the changes implemented in this report, when compared to the 2019 edition.

These harmonised tables were drafted by the Task Force on Kitchenware consisting of representatives of the National Reference Laboratories of Belgium, Germany, Greece, Italy and Spain, DG SANTE, the European Directorate for the Quality of Medicines & Health Care of the Council of Europe and the Federation of European manufacturers of Cookware and cutlery (FEC) and an independent expert. The tables were thoroughly reviewed by the National Reference Laboratories and official control laboratories dealing with food contact materials, in accordance with Article 94 (2)(a) of Regulation (EU) 2017/625. The authors acknowledge their valuable contributions.

In order to improve these guidelines, feedback from users is welcome.

(#) Commission Regulation (EU) No 10/2011 on plastic materials and articles intended to come into contact with food (https://europa.eu/!fm68fy)

Article 17: Expression of migration test results

Annex III – Food simulants

- Table 1: List of food simulants
- Table 2: Food category specific assignment of food simulants
- Table 3: Food simulant assignment for demonstrating compliance with the overall migration (OM) limit

Annex V – Compliance testing

- Table 1: Selection of test time
- Table 2: Selection of test temperature
- Table 3: Standardised conditions for testing the overall migration (OM)

Table 1 - Kitchenware examples

Main Class	Subclass	Examples
Food Preparation Wear	FPW/CA1	Apron, Bib
	FPW/CA2	Glove
	FPW/CA3	Towel, Wipe, Napkin, Tablecloth, Placemat
Food Preparation Utensil for Cold/Ambient use (FPU/CA)	FPU/CA1	Utensils used at ambient temperature for short time: Rolling pin, Lattice cutter, Grater, Garlic press, Zester, Vegetable peeler, Apple peeler, Food scale, Apple corer, Apple cutter, Biscuit press, Cherry pitter, Egg separator, Fish scaler, Flour sifter, Herb chopper, Squeezer, Reamer, Mandolin, Wire, Meat tenderiser, Fruit baller, Nutmeg grater, Pastry blender, Mortar and pestle, Roller docker, Pasta cutter, Salad spinner, Julienne peeler, Avocado slicer, Ravioli maker, Vegetable cutter with container, Hamburger press, Coconut scraper, Empanadilla mould type, Meat grinder, Vegetable brush, Cake measuring tape, Cocktail shaker, Coffee measuring spoon
Food Preparation Utensils for Cold/Ambient or Hot use	FPU/CAH1	Utensils used at ambient or hot temperature for short time: Baster, Bottle Top Baster, Pastry spatula, Pastry scraper, Pastry brush, Pastry bag, Egg piercer, Pastry mat, Salad/omelette/fitness shaker, Whisk, Marinade Syringe, Funnel, Potatoes slicer, Dessert/appetizers ring, Measuring spoon, Measuring cup, Tea net, Ricer, Food mill, Chocolate thermometer, Chocolate form
	FPU/CAH2	Cutting board (not for storage)
	FPU/CAH3	Kitchen countertop, Worktop, Bench
	FPU/CAH4	Colander, Drum sieve, Chinois, Gravy strainer, Cooling rack
	FPU/CAH5	Bowl
	FPU/CAH6	Microwave materials (only warming up or defrosting)
	FPU/CAH7	Puree masher, Potato masher, Whisk, Tongs-not foreseeable use at temperatures above 100 °C
	FPU/CAH8	Cheese cloth (dairy product), Mat for cheese draining
Food Preparation Utensils for Hot use	FPU/H1	Articles that could be used during cooking/frying/grilling: Spoon, Ladle, Spatula, Tongs, Fondue fork
	FPU/H2	Cookware , Cooking items, Microwave cookingware: Cooking/frying pan, Cooking pot, Steamer basket, Lid (sold alone), Spice/fragrance bag, Boil over preventer, Frying pan splatter screen, Bourguignon fork, Cooking ring, Susceptor, Microwave cooker
	FPU/H3	Bakeware and Ovenware items used up to 1 hour: Cake pan, Gratin dish, Cookie sheet, Muffin pan, Cooking tray, Oven liner
	FPU/H4	Bakeware and Ovenware items used more than 1 hour: Casserole, Roasting bag, Baking foil
Food Serving Utensils for Cold/Ambient use	FSU/CA1	Bread Bag, Basket (not for storage)
	FSU/CA2	Decanter, Fitness/bicycle/drinking bottle, Baby food pouch
	FSU/CA3	Dispenser: Candy dispenser, Honey dispenser, Oil dispenser, Sauce dispenser
Food Serving Utensils for Cold/Ambient or Hot use	FSU/CAH1	Cup, Glass, Drinkware
	FSU/CAH2	Open flask, Carafe, Can, Jug
	FSU/CAH3	Bottle
	FSU/CAH4	Baby bottle
	FSU/CAH5	Tableware, Plate, Dishware, Serving stand
	FSU/CAH6	Food tray, Serving board, French fries box, Finger food bag, Snack box, Popcorn box
	FSU/CAH7	Thermos flask, Isothermic drinking beaker
Food Serving Implements for Cold/Ambient use	FSI/CA1	Ice cream scoop, Ice tongues, Ice cube tray
	FSI/CA2	Specific use Cutlery and wine accessories: Cheese knife, Cheese slicer, Grapefruit knife, Salad cutlery, Tomato knife, Oyster knife, Butter curler, Honey dipper, Bar pestle, Wine tester, Bottle pourer, Wine chiller
	FSI/CA3	Salt mill, Spice mill, Pepper mill, Herb mill

Food Serving Implements for Cold/Ambient or Hot use	FSI/CAH1	Cutlery: Fork, Knive , Spoon, Rice spoon, Sauce spoon, Lobster cracker, Lobster pick, Chopsticks, Teabag squeezer, Pizza cutter, Bread knife, Fillet knife, Pie knife, Cake and pie server, Party picks, Straw
	FSI/CAH2	Bottle stopper, Cap
Food Containers for Cold/Ambient or Hot use	FC/CAH1	Lunchbox, Takeaway box
	FC/CAH2	Container: Pasta container, Cheese cellar, Butter cellar, Can cover, Garlic/onion keeper, Egg to go box, Bread box, Biscuit box, Storage box, Bag/textile for storage, Foil (not for baking), Jar, Ice cream container
Kitchen Small Appliances for Cold/Ambient use	KSA/CA1	Fridge, Cooler: Koolatron cooler, Frozen Beverage Maker, Mini fridges, Ice box, Kegerator
	KSA/CA2	Grater, Grinder: Coffee grinder, Electric grater, Vegetable chopper, Mini chopper, Peanut and nut butter maker, Wet grinder, Potato peeler
	KSA/CA3	Meat grinder and slicer: Sausage stuffer, Meat slicer, Meat grinder, Slicer
	KSA/CA4	Butter churner, Milk shake maker
	KSA/CA5	Pasta maker, Noodles maker, Electric or manual Roller, Strip Cutter
	KSA/CA6	Squeezer, Juicer, Juice Extractor, Smoothie maker
	KSA/CA7	Yogurt maker
	KSA/CA8	Ice cream maker
Kitchen Small Appliances for Cold/Ambient or Hot use	KSA/CAH1	Water dispenser, Water purifier, Water filter, Beverage dispenser, Soda maker, Spare carbonator
	KSA/CAH2	Baby formula maker/warmer, Milk frother
	KSA/CAH3	Blade
	KSA/CAH4	Still spirit
	KSA/CAH5	Blender, Agitator, Hand blender, Drink mixer, Mixer, Hand mixer, Electric mill
	KSA/CAH6	Melting pot, Food warmer, Chocolate maker
	KSA/CAH7	Heated and Bain-Marie dispenser: Chocolate fountain, Heated sauce dispenser, Soup kettle, Buffet server, Chafing dish, Wet bain marie
	KSA/CAH8	Dehydrator
Kitchen Small Appliances for Hot use	KSA/H1	Coffee maker, Moka
	KSA/H2	Immersion heater (used for water)
	KSA/H3	Tea pot and boiler: Kettle, Teapot, Eggs Boiler, Water boiler, Tea maker, Samovar, Soy milk maker, Boiler
	KSA/H4	Sous vide cooker
	KSA/H5	Popcorn maker, Cotton candy machine, Gummy and candy maker
	KSA/H6	Steamer, Baby food maker
	KSA/H7	Toaster, Hot dog griller, Waffle maker, Mini cupcake maker, Crepe/pancake maker, Quesadilla Maker
	KSA/H8	Fryer, Deep fryer, Fondue/Raclette/Raclette-Pizza set
	KSA/H9	Cooker and food processor: Slow cooker, Stirrer, Pressure cooker, Cheese maker, Bread machine, Soup maker, Food processor
	KSA/H10	Grill and oven: Indoor/Outdoor Grill, Infrared oven, Air Fryer, Electric skillet, Electric Griddle , Hotplate, Contact grill, Barbecue grid, Roaster, Combi steamer, Halogen cooking pot, Rotisserie, Electric wok, Meat-grill thermometer
	KSA/part	Parts of assembled Kitchen Small Appliances; Note: parts of the equipment used for storage should be tested separately as containers under appropriate conditions (e.g. FSU/CA2 or FC/CA1)

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Table 2 – Test conditions for plastic kitchenware

		Use				Sample prep			Test type				Food simulant							SM Conditions			S/V					
Main Class	Subclass	cold (< 20 °C)	Room Temperature	hot (> 40 °C)	storage (in months)	cut test specimen	intact article	part of it	actual use	article fill	migration cell	(total) immersion	food	A	B	C	D1	D2	E	time	Temp (°C)	label/instructions	Real	Real (infant/young)	6 (V < 0.5L or V > 10L)	6 impractical s/v	OM conditions	Notes
Food Preparation Wear	FPW/CA1	x	x			x	x			x	x	x	x	x	x			x		0.5 h	40			x		x	3/0	[0]
	FPW/CA2	x	x				x[#]			x		x	x	x	x			x		0.5 h	40					x	3/0	[0], [#] or turn inside out
	FPW/CA3	x	x			x					x	x	x	x	x			x		0.5 h	40			x		x	3/0	[0]
Food Preparation Utensils	FPU/CA1	x	x			x	x	x		x		x	x	x	x			x		0.5 h	40		x		x	x	3/0	[0]
	FPU/CAH1	x	x	x		x	x	x		x		x	x	x	x			x		0.5 h	70		x		x	x	3	
	FPU/CAH2	x	x	x		x	x				x	x	x	x	x			x		2 h	70					x	3	
	FPU/CAH3	x	x	x		x	x				x	x	x	x	x			x		2 h	70					x	3	
	FPU/CAH4	x	x	x		x	x					x	x	x	x			x		2 h	70		x		x	x	3	
	FPU/CAH5	x	x	x			x			x			x	x	x			x		2 h	70		x		x		2	followed by 24 h @ 40°C
		x	x	x	@		x			x			x	x	x			x		10 d	40		x		x		2	
	FPU/CAH6	x	x	x			x	x		x		x	x	x	x					2 h	100 or Reflux		x		x	x	5	[1] time set as 4*0.5 h
		x	x	x			x	x		x		x	x					x		0.5 h	121		x		x	x	5	
	FPU/CAH7	x	x	x		x	x					x	x	x	x			x		2 h	70					x	3	
	FPU/CAH8	x	x		@	x	x					x	x		x		x			10 d	40		x		x	x	2	if used to cook herbs goto FPU/H2
	FPU/H1			x		x	x					x	x	x	x					2 h	100 or Reflux					x	6	[1] time set as 4*0.5 h
				x		x	x					x	x					x		0.5 h	175					x	7	
	FPU/H2			x		x	x			x		x	x	x	x					2 h	100 or Reflux		x		x	x	6	[1] time set as 4*0.5 h
				x		x	x			x		x	x					x		0.5 h	175		x		x	x	7	
	FPU/H3			x		x	x			x		x	x	x	x					4 h	100 or Reflux		x		x	x	6	[1] time set as 4*1 h
				x		x	x			x		x	x					x		1 h	200		x		x	x	7	
	FPU/H4			x		x	x			x		x	x	x	x					8 h	100 or Reflux		x		x	x	6	[1] time set as 4*2 h
				x		x	x			x			x					x		2 h	200		x		x	x	7	
Food Serving Utensils	FSU/CA1	x	x				x	x		x		x	x	x	x			x		24 h	40		x	x	x	x	2	
	FSU/CA2	x	x				x	x		x		x	x		x		x			24 h	40		x	x	x		2	if hot fill goto FSU/CAH2
	FSU/CA3	x	x		@		y	x		y ; x		x	x	x	x			x		10 d	40		x		x		2	
		x	x		≤ 6		y	x		y ; x		x	x	x	x			x		10 d	50		x		x		2	[2]
		x	x		> 6		y	x		y ; x		x	x	x	x			x		10 d	60		x		x		2	[2]
	FSU/CAH1	x	x				y	x		y ; x		x	x	x	x			x		24 h	40		x	x	x		2	
			x	x			y	x		y ; x		x	x	x	x			x		2 h	70		x	x	x		3	followed by 24 h @ 40 °C, if used for storage [OM2]
	FSU/CAH2	x	x				x			x			x		x		x			24 h	40		x		x		2	
			x	x			x			x			x		x		x			2 h	70		x		x		3	followed by 24 h @ 40 °C, if used for storage [OM2]
	FSU/CAH3		x	x			x			x			x	x	x			x		2 h	70		x		x		3	followed by 24 h @ 40 °C, if used for storage [OM2]
		x	x		@		x			x			x	x	x			x		10 d	40		x		x		2	
		x	x		≤ 6		x			x			x	x	x			x		10 d	50		x		x		2	[2]
		x	x		> 6		x			x			x	x	x			x		10 d	60		x		x		2	[2]
	FSU/CAH4		x	x			x	x		x		x	x		x		x			2 h	70			x			3	followed by 24 h @ 40 °C, if used for storage [OM2]
		x	x		@		x	x		x		x	x				x			10 d	40			x			2	for milk only
	FSU/CAH5	x	x	x			x			x		x	x	x	x			x		2 h	70		x	x	x	x	3	
	FSU/CAH6	x	x	x			x	x		x		x	x	x	x			x		2 h	70		x	x	x	x	3	
	FSU/CAH7	x	x	x			x			x			x	x	x			x		24 h	100		x	x	x		4	fill with food simulant @ 100 °C and keep the container closed for 24 h at room temp.

Food Serving Implements	FSI/CA1	x				x	x					x	x			x				0.5 h	20		x			x	1	
	FSI/CA2	x	x			x	x			x		x	x	x	x			x		0.5 h	40					x	3/0	[0]
		x	x		@	x	x			x		x	x	x	x			x		24 h	40					x	2	
	FSI/CA3	x	x		≤ 6		x	x		x		x	x						x	10 d	50		x		x			[2]
		x	x		> 6		x	x		x		x	x						x	10 d	60		x		x			[2]
	FSI/CAH1	x	x	x		x	x	x				x	x	x	x			x		0.5 h	70					x	3	
		x	x	x		x	x	x				x	x	x	x			x		2 h	70					x	3	for spoons only
	FSI/CAH2		x	x			x			x		x	x	x	x			x		2 h	70		x		x		3	followed by 24 h @ 40 °C, if used for storage [OM2], Refer to Reg. 10/2011 Art. 17 § 3 and 4
		x	x		@		x			x		x	x	x	x			x		10 d	40		x		x		2	Refer to Reg. 10/2011 Art. 17 § 3 and 4
		x	x		≤ 6		x			x		x	x	x	x			x		10 d	50		x		x		2	[2], Refer to Reg. 10/2011 Art. 17 § 3 and 4
		x	x		> 6		x			x		x	x	x	x			x		10 d	60		x		x		2	[2], Refer to Reg. 10/2011 Art. 17 § 3 and 4
Food Containers	FC/CAH1	x	x	x			y	x		y ; x		x	x	x	x			x		2 h	70		x		x		3	followed by 24 h @ 40 °C, if use for storage [OM2]
		x	x	x	@		y	x		y ; x		x	x	x	x			x		10 d	40		x		x		2	
	FC/CAH2	x					y	x		y ; x		x				x				10 d	5		x		x		2	
		x	x		@		y	x		y ; x		x	x	x	x			x		10 d	40		x		x		2	
		x	x	x	≤ 6		y	x		y ; x		x	x	x	x			x		10 d	50		x		x		2	[2]
		x	x	x	> 6		y	x		y ; x		x	x	x	x			x		10 d	60		x		x		2	[2]
Kitchen Small Appliances	KSA/CA1	x	x				x		x				x		x	x	x		x			x						
	KSA/CA2	x	x				x		x				x	x	x			x				x						
	KSA/CA3	x	x				x		x				x	x				x				x						
	KSA/CA4	x	x				x		x				x		x		x	x				x						
	KSA/CA5	x	x				x		x				x				x	x				x						
	KSA/CA6	x	x				x		x				x		x		x					x						
	KSA/CA7	x	x				x		x				x		x		x					x						
	KSA/CA8	x	x				x		x				x			x						x						
	KSA/CAH1	x	x	x			x		x				x		x	x	x					x						
	KSA/CAH2	x	x	x			x		x				x		x		x					x						
	KSA/CAH3	x	x	x			x	x				x	x	x	x			x		0.5 h	70					x	3	cf. FSI/CAH1
	KSA/CAH4	x	x	x			x		x				x		x*		x					x						* if pH less than 4.5
	KSA/CAH5	x	x	x			x		x				x	x	x			x				x						
	KSA/CAH6	x	x	x			x		x				x	x	x			x				x						
	KSA/CAH7	x	x	x			x		x				x	x	x			x				x						
	KSA/CAH8	x	x	x			x		x				x	x	x			x				x						
	KSA/H1			x			x		x				H_2O			x						x						H_2O: artificial tap water EN16889
	KSA/H2			x			x		x				H_2O			x						x						H_2O: artificial tap water EN16889
	KSA/H3			x			x		x				H_2O			x						x						H_2O: artificial tap water EN16889
	KSA/H4			x			x		x				x	x	x			x				x						
	KSA/H5			x			x		x				x	x	x			x				x						
	KSA/H6			x			x		x				x	x	x			x				x						
	KSA/H7			x			x		x				x	x	x			x				x						
	KSA/H8			x			x		x				x					x				x						
	KSA/H9			x			x		x				x	x	x			x				x						
	KSA/H10			x			x		x				x	x	x			x				x						
	KSA/part	x	x	x			x			x	x	x	x	x	x			x				x						[3]

[0] replace OM3 by OM0 (0.5 h at 40 °C), when future amendment of Reg. 10/2011 will be released

[1] cf. Table 2 of Annex V

[2] use (10d, 40°C) if equilibrium is reached [cf. Reg. 10/2011 Annex V, Chapter 2 § 2.1.4.e & Amendment 2016/1416]

[3] select test time and temperature according to worst foreseeable condition use (described in the instructions when availlable)

@: see **Table 4: Rational**

"y;x": "(total) immersion" applies to "part of it" (x) only, while "article fill" applies to "intact article" (y) and "part of it" (x)

SM, OM: Specific migration, Overall Migration

s/v: surface-to-volume ratio to calculate final migration result

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Table 3 – Test conditions for metal kitchenware

Main Class	Subclass	Use				Sample prep			Test type				check national legislation	Food simulant			Specific Migration (*Release*) Conditions			S/V			Notes
		cold (< 20 °C)	Room Temperature	hot (> 40 °C)	storage (in months)	cut test specimen	intact article	part of it	actual use	article fill	migration cell	(total) immersion		food	simulant for acidic foods (pH ≤ 4.5)	artificial tap water (cf. EN 16889)	time	Temp (°C)	label/instructions	Real	6 impractical s/v	Envelope method (CoE, Metals & Alloys)	
Food Preparation Wear	FPW/CA1	x	x			x	x			x	x	x	x	x	x	x	0.5 h	40			x		
	FPW/CA2	x	x				x			x		x	x	x	x	x	0.5 h	40			x		
	FPW/CA3	x	x			x					x	x	x	x	x	x	0.5 h	40			x		
Food Preparation Utensils	FPU/CA1	x	x			x	x	x		x		x	x	x	x	x	0.5 h	40		x	x	x	
	FPU/CAH1	x	x	x		x	x	x		x		x	x	x	x	x	0.5 h	70		x	x	x	
	FPU/CAH2	x	x	x		x	x				x	x	x	x	x	x	2 h	70			x		
	FPU/CAH3	x	x	x		x	x				x	x	x	x	x	x	2 h	70			x		
	FPU/CAH4	x	x	x		x	x					x	x	x	x	x	2 h	70		x	x	x	
	FPU/CAH5	x	x	x			x			x			x	x	x	x	2 h	70		x			followed by 24 h @ 40 °C
		x	x	x	@		x			x			x	x	x	x	10 d	40		x			
	FPU/CAH6	x	x	x			x	x		x		x	x		x	x	2 h	100 or Reflux		x	x	x	
		x	x	x			x	x		x		x	x	x					x	x	x	x	
	FPU/CAH7	x	x	x		x	x					x	x	x	x	x	2 h	70			x	x	
	FPU/CAH8	x	x		@	x	x					x	x	x	x	x	10 d	40		x	x		if used to cook herbs goto FPU/H2
	FPU/H1			x		x	x					x	x		x	x	2 h	100 or Reflux			x	x	
				x		x	x					x	x	x					x		x	x	
	FPU/H2			x		x	x			x		x	x		x	x	2 h	100 or Reflux		x	x	x	
				x		x	x			x		x	x	x					x	x	x	x	
	FPU/H3			x		x	x			x		x	x		x	x	2 h	100 or Reflux		x	x	x	
				x		x	x			x		x	x	x					x	x	x	x	
	FPU/H4			x		x	x			x		x	x		x	x	2 h	100 or Reflux		x	x	x	
				x		x	x			x			x	x					x	x	x	x	
Food Serving Utensils	FSU/CA1	x	x				x	x		x		x	x	x	x	x	24 h	40		x	x		
	FSU/CA2	x	x				x	x		x		x	x	x	x	x	24 h	40		x			if hot fill goto FSU/CAH2
	FSU/CA3	x	x		@		y	x		y ; x		x	x	x	x	x	10 d	40		x			
		x	x		≤ 6		y	x		y ; x		x	x	x	x	x	10 d	50		x			
		x	x		> 6		y	x		y ; x		x	x	x	x	x	10 d	60		x			
	FSU/CAH1	x	x				y	x		y ; x		x	x	x	x	x	24 h	40		x			
			x	x			y	x		y ; x		x	x	x	x	x	2 h	70		x			followed by 24 h @ 40 °C, if used for storage
	FSU/CAH2	x	x				x			x			x	x	x	x	24 h	40		x			
			x	x			x			x			x	x	x	x	2 h	70		x			followed by 24 h @ 40 °C, if used for storage
	FSU/CAH3		x	x			x			x			x	x	x	x	2 h	70		x			followed by 24 h @ 40 °C, if used for storage
		x	x		@		x			x			x	x	x	x	10 d	40		x			
		x	x		≤ 6		x			x			x	x	x	x	10 d	50		x			
		x	x		> 6		x			x			x	x	x	x	10 d	60		x			
	FSU/CAH4		x	x			x	x		x		x	x	x	x	x	2 h	70		x			followed by 24 h @ 40 °C, if used for storage
		x	x		@		x	x		x		x	x	x		x	10 d	40		x			for milk only
	FSU/CAH5	x	x	x			x			x		x	x	x	x	x	2 h	70		x	x		
	FSU/CAH6	x	x	x			x	x		x		x	x	x	x	x	2 h	70		x	x		
	FSU/CAH7	x	x	x			x			x			x	x	x	x	24 h	100		x			fill with food simulant @ 100 °C & keep the container closed for 24 h @ RT

Food Serving Implements	FSI/CA1	x				x	x				x	x	x			x	0.5 h	20		x	x	x	
	FSI/CA2	x	x			x	x			x	x	x	x	x	x		0.5 h	40			x	x	
		x	x		@	x	x			x	x	x	x	x	x		24 h	40			x	x	
	FSI/CA3	x	x		≤ 6		x	x		x	x	x	x		x		10 d	50		x			
		x	x		> 6		x	x		x	x	x	x		x		10 d	60		x			
	FSI/CAH1	x	x	x		x	x				x	x	x	x	x		0.5 h	70			x	x	
		x	x	x		x	x				x	x	x	x	x		2 h	70			x	x	for spoons only
	FSI/CAH2		x	x			x	x		x	x	x	x	x	x		2 h	70		x			followed by 24 h @ 40 °C, if used for storage
		x	x		@		x	x		x	x	x	x	x	x		10 d	40		x			
		x	x		≤ 6		x	x		x	x	x	x	x	x		10 d	50		x			
		x	x		> 6		x	x		x	x	x	x	x	x		10 d	60		x			
Food Containers	FC/CAH1	x	x	x			y	x		y ; x	x	x	x	x	x		2 h	70		x			followed by 24 h @ 40 °C, if used for storage
		x	x	x	@		y	x		y ; x	x	x	x	x	x		10 d	40		x			
	FC/CAH2	x					y	x		y ; x	x	x	x		x		10 d	5		x			
		x	x		@		y	x		y ; x	x	x	x	x	x		10 d	40		x			
		x	x	x	≤ 6		y	x		y ; x	x	x	x	x	x		10 d	50		x			
		x	x	x	> 6		y	x		y ; x	x	x	x	x	x		10 d	60		x			
Kitchen Small Appliances	KSA/CA1	x	x				x		x			x	x	x	x				x				
	KSA/CA2	x	x				x		x			x	x	x	x				x				
	KSA/CA3	x	x				x		x			x	x		x				x				
	KSA/CA4	x	x				x		x			x	x	x	x				x				
	KSA/CA5	x	x				x		x			x	x		x				x				
	KSA/CA6	x	x				x		x			x	x	x	x				x				
	KSA/CA7	x	x				x		x			x	x	x	x				x				
	KSA/CA8	x	x				x		x			x	x		x				x				
	KSA/CAH1	x	x	x			x		x			x	x	x	x				x				
	KSA/CAH2	x	x	x			x		x			x	x	x	x				x				
	KSA/CAH3	x	x	x			x	x			x	x	x	x	x						x	x	cf. FSI/CAH1
	KSA/CAH4	x	x	x			x		x			x	x	x	x				x				
	KSA/CAH5	x	x	x			x		x			x	x	x	x				x				
	KSA/CAH6	x	x	x			x		x			x	x	x	x				x				
	KSA/CAH7	x	x	x			x		x			x	x	x	x				x				
	KSA/CAH8	x	x	x			x		x			x	x	x	x				x				
	KSA/H1			x			x		x			x			x				x				Food corresponds to artificial water
	KSA/H2			x			x		x			x			x				x				Food corresponds to artificial water
	KSA/H3			x			x		x			x			x				x				Food corresponds to artificial water
	KSA/H4			x			x		x			x	x	x	x				x				
	KSA/H5			x			x		x			x	x	x	x				x				
	KSA/H6			x			x		x			x	x	x	x				x				
	KSA/H7			x			x		x			x	x	x	x				x				
	KSA/H8			x			x		x			x	x		x				x				
	KSA/H9			x			x		x			x	x	x	x				x				
	KSA/H10			x			x		x			x	x	x	x				x				
	KSA/part	x	x	x			x			x	x	x	x	x	x				x				[1]

National legislation (or other relevant guidelines) shall be taken into account for compliance assessment.

[1] select test time and temperature according to worst foreseeable condition use (described in the instructions when availlable)

"y;x": "(total) immersion" applies to "part of it" (x) only, while "article fill" applies to "intact article" (y) and "part of it" (x)

@: see Table 4 Rational

s/v: surface-to-volume ratio to calculate final migration result

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Table 4 - Rational for the selection of test time and temperature (SM)

time	temperature	Sub-class	Rational/justification
		general	**Plastic:** These conditions apply only for home use, not for industrial use in the food processing or catering industry, where the applicable conditions would be different.
		general	**Metals and alloys:** (1) These conditions apply only for home use, not for industrial used in the food processing or catering industry, where the applicable conditions would be different. (2) National legislation should be taken into account or other relevant guidance to show compliance. (3) For articles (except sub-classes: FPU/CAH6, FPU/H1-H4) testing time and temperature are in line with the testing conditions proposed for plastics materials in Regulation 10/2011. It is assumed that consumers would in most cases make the same use of an specific utensil, independently of the material it is made of. This makes testing of multi-materials less laborious. (4) Specific labeling should be considered.
0.5 h	20 °C	FSI/CA1	According to Regulation 10/2011, for utensils in contact with food for a short time (≤ 0.5 h) at cold temperature (refrigerated), these test conditions apply: 20 °C for 0.5 h.
0.5 h	40 °C	FPW/CA1	According to Regulation 10/2011: - for utensils in contact with food for a short time (≤ 0.5 h) at ambient temperature; or - for gloves, placemats and tablecloths, used for ≤ 2 h at ambient temperature, having a short contact time (≤ 0.5 h) with the same portion of food; these test conditions apply: 40 °C for 0.5 h.
		FPU/CA1	
		FSI/CA2	
		FPW/CA2	
		FPW/CA3	
0.5 h	70 °C	FPU/CAH1	According to Regulation 10/2011, for utensils in contact with hot food (hot fill) for a short time (≤ 0.5 h) these test conditions apply: 70 °C for 0.5 h.
		FSI/CAH1	
		KSA/CAH3	
2 h	70 °C	FPU/CAH2	Accorging to Regulation 10/2011, for utensils in contact with food for short periods of time at temperatures between 70 and 100 °C (cf. "hot fill"), these test conditions apply: 2 hours at 70 °C.
		FPU/CAH3	
		FPU/CAH4	
		FPU/CAH7	
		FSU/CAH3	
		FSU/CAH4	
		FSU/CAH5	
		FSU/CAH6	
		FSI/CAH1	
2 h, 70 °C followed by 24h , 40 °C		FPU/CAH5	Foods may be in contact with these utensils for short periods of time at temperatures between 70 and 100°C. The food/beverage could then be stored in the same "container" for a day at room temperature or colder. According to Regulation 10/2011 these test conditions apply: 2 h at 70 °C (cf. hot fill) followed by 24 h at 40 °C.
		FSU/CAH1	
		FSU/CAH2	
24 h	40 °C	FSU/CA1	According to Regulation 10/2011, for utensils in contact with food (drinkware, tableware and cutlery used for cold and RT purpose ONLY) for up to 1 day at ambient temperature,these test conditions apply: 24 h and 40 °C.
		FSU/CA2	
		FSU/CAH1	
		FSU/CAH2	
		FSI/CA2	
24 h	100 °C	FSU/CAH7	Fill with food simulant @ 100 °C and keep the container closed for 24 h - as real use for thermos

time	temperature	Sub-class	Rational/justification
10 d	40 °C	FPU/CAH5 FPU/CAH8 FSU/CAH4 FSI/CA3 FC/CAH1 FC/CAH2	According to Regulation 10/2011, - for utensils in contact with food for more than 30 days at refrigerated or frozen temperature, including hot-fill conditions and/or heating up to 70 °C ≤ T ≤ 100 °C for maximum t = 120/2^((T-70)/10) minutes; - for utensils in contact with food for up to 30 days at room temperature.
10 d	50 °C	FSU/CA3 FSU/CAH3 FSI/CA3 FSI/CA4 FC/CAH2	According to Regulation 10/2011, for utensils in contact with food for more than 30 days but less than 6 months at room temperature, including hot-fill conditions and/or heating up to 70 °C ≤ T ≤ 100 °C for maximum t = 120/2^((T- 70)/10) minutes, these test conditions apply.
10 d	60 °C	FSU/CA3 FSU/CAH3 FSI/CA3 FSI/CA4 FC/CAH2	According to Regulation 10/2011, for utensils in contact with food for more than 6 months at room temperature, including hot-fill conditions and/or heating up to 70 °C ≤ T ≤ 100 °C for maximum t = 120/2^((T- 70)/10) minutes, these test conditions apply.
2 h	100 °C or Reflux	FPU/CAH6 FPU/H1 FPU/H2	**Plastics:** According to Regulation 10/2011, for utensils used for a maximum of 0.5 h at temperatures above 100 °C, the following test conditions in aqueous simulants apply: 100 °C or at reflux temperature for a duration of four times the time selected according to the general test conditions, resulting in contact times of 2 h (=4x0.5h). **Metals and Alloys:** According to the CoE guide conditions for use with boiling contents, articles should be tested for 2 h at the respective boiling temperature of the food simulant. This applies also to FPU/H3 and FPU/H4.
4 h	100 °C or Reflux	FPU/H3	**Plastics:** According to Regulation 10/2011, for utensils used for a maximum of 1 hour at temperatures above 100 °C the following test conditions in aqueous simulants apply: 100 °C or at reflux temperature for a duration of four times the time selected according to the general test conditions, resulting in contact times of 4 h (=4x1h).
8 h	100 °C or Reflux	FPU/H4	**Plastics:** According to Regulation 10/2011, for utensils used for a maximum of 2 hour at temperatures above 100 °C the following test conditions in aqueous simulants apply: 100 °C or at reflux temperature for a duration of four times the time selected according to the general test conditions, resulting in contact times of 8 h (=4x2h).
0.5 h	121 °C	FPU/CAH6	**Plastics:** According to Regulation 10/2011, for utensils used for up to 0.5 h at temperatures up to 121 °C in a microwave the following test conditions apply: 0.5 h at 121 °C for food simulant D2 (suitable vegetable oil needs to be selected) and E.
0.5 h	175 °C	FPU/H1 FPU/H2	**Plastics:** According to Regulation 10/2011, for utensils (other than bakeware) used for up to 0.5 h at temperatures up to 175 °C the following test conditions apply: 0.5 h at 175 °C using food simulant D2 (suitable vegetable oil needs to be selected) and E.
1 h	200 °C	FPU/H3	**Plastics:** According to Regulation 10/2011, for utensils used less than 1 h at temperatures up to 200 °C , the following test conditions apply: 1 h at 200 °C using food simulant D2 (suitable vegetable oil needs to be selected) and E.
2 h	200 °C	FPU/H4	**Plastics:** According to Regulation 10/2011, for utensils used for more than 1 h at temperatures up to 200 °C , the following test conditions apply: 2 h at 200 °C using food simulant D2 (suitable vegetable oil needs to be selected) and E.

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Table 5 - Implemented modifications in 2nd edition (2020)

Plastics (2019)	Plastics 2nd edition (2020)
Table 1: Kitchenware examples	
	FPU/CAH8:
FPW/CA4:	Cheese cloth (dairy product), ~~Plastic~~
Cheese cloth (dairy product), Plastic mat for cheese draining	Mat for cheese draining
FPU/CAH1: …Whisk	FPU/CAH7: …Whisk
FPU/H2: … Fondue fork	FPU/H1: … Fondue fork
FPU/H2: …	FPU/H2: … + Cooking/frying pan, Cooking pot
FPU/H3: Bakeware and Ovenware items: Cake pan, Gratin dish, Cookie sheet, Muffin pan, Cooking tray, Oven liners	FPU/H3: Bakeware and Ovenware items used up to 1 hour: Cake pan, Gratin dish, Cookie sheet, Muffin pan, Cooking tray, Oven liner
FPU/H4: Roasting bags	FPU/H4: **Bakeware and Ovenware items used more than 1 hour**: Casserole, Roasting bag, Baking foil
FSU/CA2: Decanter, Fitness/bicycle bottle, Baby food pouch	FSU/CA2: Decanter, Fitness/bicycle/drinking bottle, Baby food pouch
FSU/CAH3: Bottle (without cap)	FSU/CAH3: Bottle ~~(without cap)~~
FSI/CA3: Bottle stopper, Cap	FSI/CAH2: Bottle stopper, Cap
FSI/CA4: Salt mill, spice mill, Pepper mill, Herb mill	FSI/CA3: Salt mill, spice mill, Pepper mill, Herb mill
FC/CAH2: ... Foils	FC/CAH2: Bag/textile for storage, Foil (not for baking)
KSA/H8: … Fondue set	KSA/H8: … Fondue/Raclette/Raclette-Pizza set
KSA/H10: …Roster	KSA/H10:... + Barbecue grid, Roaster, Meat-grill thermometer
Table 2: Testing conditions for plastic kitchenware	
FPW/CA4 replaced by …	FPU/CAH8
FSI/CA3 replaced by …	FSI/CAH2
FSI/CA4 replaced by …	FSI/CA3
	Use (storage (in months)):
"x" replaced by …	@ (see Table 4: Rational)
FPU/CAH5,CAH8; FSU/CAH4; FSI/CA2,CA3; FC/CAH1, CAH2	FPU/CAH5,CAH8; FSU/CAH4; FSI/CA2,CA3; FC/CAH1, CAH2
"< 6" replaced by …	"≤ 6"
FSU/CA3,CAH3; FSI/CA3,CA4; FC/CAH2	FSU/CA3,CAH3; FSI/CA3,CA4; FC/CAH2
	Sample prep:
FPU/CA1:…	FPU/CA1:…+ (x) part of it
FPU/CAH1:…	FPU/CAH1:…+ (x) part of it
	Food simulant:
FSI/CA1: B, D1, D2	FSI/CA1: C
KSA/CA8: B, D1, D2	KSA/CA8: C
	Specific Migration Conditions:
FPU/CAH5: 2h 70°C	FPU/CAH5: 2 h 70°C followed by 24 h @ 40°C
FSU/CA3: ...	FSU/CA3: … + 10 d 40 °C
FSU/CAH3: …	FSU/CAH3: … + 10 d 40 °C
FSI/CA3: (Bottle stopper, Cap) …	FSI/CAH2: (Bottle stopper, Cap) … + 2 h 70 °C followed by 24 h 40 °C, if used for storage
FC/CAH1: …	FC/CAH1: … + 2 h 70 °C followed by 24 h 40 °C, if used for storage
FC/CAH2: …	FC/CAH2: … + 10 d 5 °C
	S/V:
6 (V < 0.5L) and 6 (V > 10L)	6 (V < 0.5L or V > 10L)
FSI/CA1: (x) 6 impractical s/v	FSI/CA1: (x) Real, (x) 6 impractical s/v
	Overall Migration Conditions:
OM3 replaced by …	3/0: replace OM3 by OM0 (0.5 h at 40 °C), when future amendment of Reg. 10/2011 will be released
FPW/CA1, CA2, CA3; FPU/CA1; FSI/CA2	FPW/CA1, CA2, CA3; FPU/CA1; FSI/CA2
FPU/CAH5, FSI/CA2: OM3	FPU/CAH5, FSI/CA2: OM2
	Notes
if storage goto 24h/40°C [OM2]	followed by 24 h @ 40 °C, if used for storage [OM2]
FSU/CAH1, CAH2, CAH3, CAH4	FSU/CAH1, CAH2, CAH3, CAH4
FSU/CAH4:.. (second raw)	FSU/CAH4:.. for milk only (second raw)
FSU/CAH7: fill with simulant @ 100 °C and keep the container closed for 24 h	FSU/CAH7: fill with food simulant @ 100 °C and keep the container closed for 24 h at room temperature
FSI/CA3: Refer to Art. 17 § 3 and 4	FSI/CAH2: Refer to Reg. 10/2011 Art. 17 § 3 and 4
artificial tap water	artificial tap water EN16889
KSA/H1, H2, H3	KSA/H1, H2, H3
[1]	[0]
[2], [3] and [4] replaced by …	**[1], [2[and [3], respectively**

Note: Modifications are highlighted in RED

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