

	Food contact boxes	Baking forms	Dishes/plates	Utensils	Pipes	Conveyor belts
Worst case exposure						
JRC testing conditions according to report from 2009	Testing conditions for articles that can be used for food preparation and cooking using a microwave Simulant B, simulant D and D1 Repeat use conditions on article filled or total immersion For microwave ovens, migration may be either a conventional or a microwave oven provided the the appropriate time and temperature are selected.		They are defined to be mainly flat vessels on which food is served. Simulant B, simulant D and D1 for 2 hours at 70°C (corresponding to hot fill conditions < 100°C for < 15 minutes down to room temperature) Repeat use conditions on article filled The amount of food cannot be established. Therefore it falls under article 17.2 (b) and is S/V is set at 6 dm²/kg			
JRC testing conditions (draft report from 2014)	<p>Not detailed in the JRC guidances</p> <p>If maximum time and temperature are mentioned on label, equivalent test conditions to be used according to Reg UE No 10/2011. The temperature of the plastic at the interface shall be determined according to CEN Standard EN 14233:2002 « Determination of temperature of plastics materials and articles at the plastics/food interface during microwave and conventional oven heating » in order to select the appropriate temperature for migration testing.</p>		<p>If the dish is filled with hot food (all type of food) at 85°C, cooled down within 25 minutes, stored for a maximum 20 days under refrigerated conditions (4-8°C) and then heated in a microwave for 4 minutes at 100°C</p> <p>We have 2 possibilities for testing: - D2 for 2 hours at 130°C (or food simulants A,B,C,D1 for 8 hours at 100°C) followed by 10 days at 40°C - D2 for 14,2 days at 60°C (correspond to 12,6 days at 60°C (2h at 130°C) + 1,6 day at 60°C (10 days at 40°C) or food simulants A,B,C,D1 for 9 days at 60°C (7,4 days at 60°C (8 h at 100°C) + 1,6 days at 60°C (10 days at 40°C)</p> <p>They should be tested intact in repeated use conditions If there is no label for use: simulant D2 at 175°C for ½ hour or 2 hours at 100°C with simulant B or at reflux temperature with simulant D1 Total immersion is recommended. The article should be tested intact. Non food contact parts can be removed for ease of testing. However, temperatures up to maximum 225°C are not unlikely to occur during limited contact time. In this case, the utensil is labelled as being suitable for contact food at higher temperatures. The utensil needs to be tested using food simulant E at 225°C for ½ hour</p>	<p>Example is given on tubing in milk machine which may simulate the dynamic regime of pipes in the food industry. Rubber tubing has an inside diameter of 15 mm and a wall thickness of 1.5 mm. Length may vary from 1 to 2,5 m. The temperature of the milk is 30°C. Each cow is connected to the machine for 15 minutes and delivers 10 l of milk on each occasion, twice a day. Life time of the tubing is guaranteed for 1 year but will be replaced only after 2 years. The unit has a maximum capacity of 10 cows / milking session. Tubing is cleaned with hot water before first use and is between two milking sessions. From these data, are calculated: - The contact area which may be calculated from the diameter and the length of the tubing $S = 2\pi (D/2) * L$, calculated at 273,14*(15/2)*2500 = 11,78 dm² - The internal volume (V, l) of the tube calculated at 0,4418 l - The flow of the milk (F, l/min) = 0,667 l/min - The Ratio S/V which takes into account the decrease of the migration with real contact time while more milk has flowed through the tube. Therefore an integrated volume that has been in contact with the surface area of the tube need to be considered: it corresponds to one batch or just 1 litre If it is considered an intended use of 100 l milk per day, milk flow of 0,667 l/min, and milk in the tube is 30°C, a contact area of 11,78 dm² and the cleaning of the tube every day, we calculate S/V ratio = 11,78 / 100 = 0,12 dm²/l - Integrated contact time = 100 l / 0,667 l/min = 150 min = 2,5 hours - Therefore migration testing has to be carried out for 6 hours at 40°C using the realistic S/V ratio of 0,12 dm²/l - Without any indication on the intended use of the pipe, conditions testing corresponding to the flow of 1 litre in the tube should be considered: this leads to a ratio S/V of 11,78 dm²/l and an integrated contact time of 1,5 day and therefore to a test condition of 5 min at 40°C using the realistic S/V ratio of 11,78 dm²/l</p>	<p>Example is given on a conveyor belt for bakery products. The key parameters to be taken into considerations are: - Contact time calculated from the length of the belt combined with the speed Spa. - Surface area when possible (by default 6 dm²/kg food), - Food Temperature (cooling time), - Food dimensions and weight allows to calculate the contact area per article and therefore the S/V ratio. For example, the belt has a length of 60m with a width of 0,6 m. Its life time is 3 years. Belt is running at 0,36 km/h. At the start the belt has a temperature of 90°C and at the end the cakes are cooled down 20°C. The cakes have a size of 8 cm diameter and a weight of 100 g each. The average production is 10 000 cakes an hour. According to good hygiene practice, the belt is cleaned at least at the end of the day. The contact time is calculated to be 10 minutes (60 m / 360m/h * 60 min). The temperature decreases from 90 to 20°C within 15 minutes These conditions are comparable to hot fill conditions (2 hours at 70°C). The surface contact with the total quantity of food is not clear. A S/V ratio of 6 dm²/kg is set.</p>	
Practical guidance on metals and alloys_2013_1st edition			Compliance is established on the findings of the 3rd test. However, the sum of the results of the first and second test should not exceed an exposure equivalent to daily use for one week (i.e. seven times the Specific Release Limit, SRL) according to the formula : RESULT 1st test + RESULT 2nd test < 7 * SPL. This takes into account the overall acceptability of a food contact article. The guidance recommends for articles that can be filled, to fill them with the suitable food simulants to approximately 2/3 of the total capacity and for articles that cannot be filled, to test them, intact by immersion to a reasonable depth reflecting normal use of the article. It also recommends to treat the samples, between tests, as described under the 'the pre-treatment of materials and articles'. Where these instructions apply only to the first use or where the instructions indicate that no washing is required before and between uses, this must be taken into consideration. For calculation on consumer's exposure for article that cannot be filled and whose surface area cannot be linked with consumer's exposure, refer to Annex 8.4			
Resolution AP(2004)4 on rubbers				Based on the same parameters than those described in Example referred to in JRC testing conditions (draft report from 2014), it is calculated: Surface area is determined to be 1178 cm² for the worst case situation (length of 2,5 m) Determination of the amount of milk following two approaches: - the cow is delivering 10 l of milk in 15 min: so the minimum contact time is 1/1,5 min - the 10 cows are delivering 365 * 200 l = 73 000 l milk in one year So R1 = 1178 cm² / 100 l = 11,8 but maximum value is set at 1 and R12 = 1178 / 73000 * 100 = 0,00016 R2 is calculated at the contact temperature of 30°C: R230°C = 0,10 R3 depends on the calculation of R1 and the 2 approaches are considered Rtime1 = 1,5 min for 1 liter so R3 = 0,0025 Rtime2 = 1825 hours for 73000 liters so R3 = 182,5 but maximum value is 1 R4 is calculated from the number of recurrent uses connected with the different approaches as given for the calculation of R1: Approach for the contact period per liter milk taken, so the number of recurrent uses is considered as the total amount of liters of milk passing the tubing during its period of use: 10 cows delivering 10 l/session and 2 sessions/day and a life time at least one year, the total of recurrent uses is 20 x 10 times a day or 73000 for one year, leading to R41 = 0,0188 Results per year = 1 exposure, leading to R41 = 1 Rtotal calculated according the 2 different approaches is: Rtotal 1 = 1 + 0,1 + 0,0025 + 0,00188 = 0,00000047 Rtotal 2 = 0,000165 + 0,1 + 1 + 1 = 0,000016 The tubing is milk machine is therefore classified in Category 3 which does NOT require migration testing to be done, for the 2 approaches.	Based on the same parameters than those described in Example referred to in JRC testing conditions (draft report from 2014), it is calculated: R1 based on contact area of one cake (=50,2 cm²) leading to a relative contact area AR = 50,2 * 100 / 1000 = 502 cm²/kg cake & R1 = 5,02 (=AR/100) & R1 = 1 (maximum value) R2 is calculated at 45°C (mean temperature, assuming a linear gradient temperature) to be R245°C = 0,140- Alternatively, worst case (higher temperature) could be considered: R290°C = 0,250 R3 is estimated from belt speed (6 m/min) and the length of the belt (60 m) : one cake is on the belt for 10 min (0,167 h) & R3 = 0,0167 R4 is calculated from the number of recurrent contacts of 1 cake with 1 m the same place on the belt: the length of the belt is 60 m but the total length (up and down) to be considered is 120 m : only 20 minutes after the same spot on the belt can accept a new one. This is 3 cakes an hour and 24 cakes a day. After 3 years at 220 working days, the total number of recurrent contact is 15 840, so R4 is calculated to 0,004. They lead to Rtotal45°C = 9,4, 10-6 for T= 45°C. And to Rtotal90°C = 1,7, 10-5 for T= 90°C The conveyor belt is therefore classified in Category 3 which does NOT require migration testing to be done.	