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# Global Legislation for Food Packaging Materials



## 20

### Southeast Asia Food Contact

#### Legislation Update

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Over the past decades, some Southeast Asian countries have established various regulations for food containers and packaging materials, although most of the focus of regulatory bodies is still on food. Regulations for food containers and packaging materials in Southeast Asian countries usually provide general guidelines that prohibit any package or container that yields toxic, injurious, or hazardous substance, and put forward limitations on heavy metals and other hazardous substances.

In this chapter, regulations for food containers and packaging materials in Singapore, Malaysia, and Thailand will be discussed.

#### 20.1

##### Singapore

The Singapore regulations on food containers and packaging materials are the Food Regulations 1988 that came into operation on October 1, 1988, specified under Chapter 283, Section 56 [1] of the Sale of Food Act. The regulation is currently governed under the Agri-food and Veterinary Authority of Singapore.

The definition of container under the regulation “includes any form of packaging of food for sale as a single item, whether by way of wholly or partly enclosing the food or by way of attaching the food to some other article and in particular includes a wrapper or confining band [1].”

The Singapore food regulations have the following requirements regarding containers for food under Part III, 37 [1].

The following PVC package/containers are prohibited:

- 1) If package or container yields, or is likely to yield more than 0.05 ppm vinyl chloride monomer; or

- 2) If package or container yields, or is likely to yield, compounds known to be carcinogenic, mutagenic, teratogenic, or any other poisonous or injurious substance.
- 3) If package or container may release lead, antimony, arsenic, cadmium, or any other toxic substance to food.

There are specific requirements on the level of lead in ceramic foodware. The allowed level of lead is dependent on types/shapes of the container. For example, it only allows if

- 1) the maximum amount of lead in any one of six units examined is not more than 3.0 mcg of lead/ml of leaching solution in the case of a flatware with an internal depth of not more than 25 mm;
- 2) the maximum amount of lead in any one of six units examined is not more than 2.0 mcg of lead/ml of leaching solution in the case of a small hollowware with a capacity of less than 1.1 l but excluding cups and mugs;
- 3) the maximum amount of lead in any one of six units examined is not more than 1.0 mcg of lead/ml of leaching solution in the case of a large hollowware with a capacity of 1.1 l or more but excluding pitchers;
- 4) the maximum amount of lead in any one of six units examined is not more than 0.5 mcg of lead/ml of leaching solution in the case of cups and mugs; and
- 5) the maximum amount of lead in any one of six units examined is not more than 0.5 mcg of lead/ml of leaching solution in the case of pitchers [1].

The regulation has also a requirement that lead piping shall not be used for beer, cider, or other beverages or liquid food.

## 20.2

### Malaysia

Malaysian regulations on food containers and packaging materials are the Food Regulations 1985 [2], specified under the Food Act 1983. The regulation is governed by the Ministry of Health.

Sections 27–36 (A) of the regulation provides specific requirements on food package/containers. The details are as follows:

#### 27. Use of Harmful Packages Prohibited

It is prohibited to use food container/packaging which yields or could yield to its contents, any toxic, injurious or tainting substance, or which contributes to the deterioration of the food.”

#### 28. Safety of Packages for Food

It is prohibited to use food container/packaging either capable of imparting lead, antimony, arsenic, cadmium or any other toxic substance to any food prepared, packed, stored, delivered or exposed in it, or is not resistant to acid

unless the package, appliance, container or vessel satisfies the test described in the Thirteenth Schedule.

Under 13th schedule there are tests for food container/packaging for storage of food and for cooking. For food container/packaging for storage, the food container/packaging is filled with leaching solution (4% acetic acid in water v/v) for 24 h under room temperature. The leaching solution should contain less than 0.2 ppm of antimony, arsenic, cadmium, individually, and <2 ppm of lead for the container/packaging to be used for storage.

For food container/packaging for cooking, the container with leaching solution will be heated to 120 °C and boiled for 2 h. Then, the container with leaching solution will be kept at room temperature for 22 h. The leaching solution should contain less than 0.7 ppm of antimony, arsenic, cadmium, individually, and <7 ppm of lead for the food container/packaging to be used for cooking.

Under Section 29: Use Of Polyvinyl Chloride Package Containing Excess Vinyl Chloride Monomer Prohibited, "It is prohibited to use food container/packaging made of polyvinyl chloride that contains more than 1 mg/kg of vinyl chloride monomer." Furthermore, the regulation prohibits sale of food in package if the food itself contains more than 0.05 mg/kg of vinyl chloride monomer.

Malaysian regulation has strict restrictions regarding recycling of packages/containers. It is prohibited to use recycled package for certain foods such as sugar, flour, and edible oil. Package for product of swine origin shall not be used for food of nonswine origin.

If a nonbottle package has been used for food, it is prohibited to bring it in contact with food again, unless an extra layer is brought between the recycled plastic and the food.

Any bottle that has previously been used for alcoholic beverage or shandy shall not be used for any food, other than alcoholic beverage and shandy.

However, certain kind of recycling for similar products is allowed. For example, polycarbonate containers of not less than 20 l in size that have previously been used for natural mineral water may be used for the same purpose. Glass bottles that have been used for alcoholic beverage or shandy can be used for the same purpose. The same applies to boxes or crates for vegetable/fruit.

Recycling of a packaging material previously used for another food product is prohibited for milk, soft drink, alcoholic beverage or shandy, vegetable, fish or fruit, and polished rice.

#### 34. Presumption As To The Use Of Any Packages

For the purposes of regulations 32 and 33, where a package, appliance, container, or vessel containing food bears any mark or label belonging to another food it shall be presumed that such package, appliance, container or vessel has been used for that particular food as shown by such mark or label.

The regulation makes it very clear that toys, coins, and so on are not allowed to be placed on food. However, the following are allowed: article for measuring

the recommended quantity of food to be consumed, provided that such article is sterile, label, and sachet of reduced iron powder for the purpose of absorbing oxygen.

The regulation has the following requirements regarding “reduced iron powder”:

- 1) The reduced iron powder . . . shall be enclosed in a sachet in such a manner that the oxygen absorber will not contaminate, taint, or migrate into the food.
- 2) The sachet itself and its label shall compose of material that will not contaminate, taint, or migrate into the food. A list of chemicals allowed to be in the sachet of reduced iron powder is provided in the regulation. It includes calcium chloride, calcium hydroxide, iron oxide, and so on.
- 3) The sachet of reduced iron powder shall be labeled with the words “OXYGEN ABSORBER” or any words having similar effect. The caution statements “DO NOT EAT CONTENTS” and “CONTAINS IRON POWDER” should be included on the label.

### 20.3

#### Thailand

The Thai regulations on food containers and packaging materials include several notifications issued under the Food Act of B.E. 2000 (1979) [3], by the Ministry of Public Health. In general, the food container must conform with the following quality or standard: must be clean; must not give out substance to contaminate the food and therefore likely to be harmful to health; must not contain “pathogenic micro-organisms”; and must give out no color to contaminate the food. It also specifies that the container must have never been used before, unless it is glass, ceramic, or plastic. It should have never been previously used for fertilizer, poisonous substance, or substance likely to be harmful to health. However, there are specifications of packaging depending on type of material used.

There are three notifications under this Food Act, which are as follows:

- 1) **Notification No. 92 B.E. 2528 (1985):** Prescription for quality or standard for food containers, use of food containers, and prohibition of use of things as food containers. This notification specifies the migration limits of lead and cadmium that leach from ceramic and enameled metal containers. The limits are specific to container/vessel shapes, for example, small deep vessels, large deep vessels, and so on. There is specific definition of various container/vessel shapes in the regulation. For example, 2.5 mg/l of lead and 0.25 mg/l of cadmium are allowed for infant food containers. On the other hand, 7 and 0.7 mg/l of lead and cadmium, respectively, are allowed for shallow vessels. The definition of the shallow vessel is “vessels of a depth not more than 25 mm when measured vertically from the deepest point internally to the horizontal level of the topmost part of the rim.” This notification is expected to be soon revised in order to be in line with international standards.

- 2) **Notification No. 295 B.E. 2548 (2005) [3]:** Qualities or standards for container made of plastic. This notification regulates 12 types of plastic food packaging. General requirements of this regulation are very similar to that of Notification No. 92 as described in Clause 3. For example, this regulation requires that the container made from plastic must be clean; must not give out substance to contaminate the food and therefore likely to be harmful to health; must not contain “pathogenic microorganisms”; and must not give out any color to contaminate the food.

According to Clause 4 of Notification No. 295, the plastic packaging materials must conform with the specifications described in this notification, which include specifications both for material and for migration test. Notification No. 295 puts forward specifications for containers made of plastic. Specifications under Notification No. 295 are divided into two categories, the first part sets limits for heavy metals such as lead and cadmium in the plastic itself, and other hazardous chemicals that can migrate into food depending on the type of plastic used such as vinyl chloride monomer from polyvinyl chloride, bisphenol A from polycarbonate, and so on (see Table 20.1).

The second part sets limits for substances that migrate into food simulants. This includes phenol, formaldehyde, and so on (see Table 20.2). The limits are again specific to a particular type of plastic, for example, polyvinyl chloride, polyethylene polypropylene, polystyrene, and so on. Clause 5 of Notification No. 295 states that “The analysis of qualities or standards of dispersion of plastic containers shall be carried out by the methods prescribed by Food and Drug Administration.” Based on the present best understanding, the migration tests are done using four food simulants: water for food with pH > 5, 4% acetic acid for food with pH < 5, *n*-heptane for fatty food, and 20% ethanol for alcoholic food.

Clause 6 of Notification No. 295 specifies that plastic containers used for containing milk or milk products shall be made of polyethylene, ethylene, 1-alkene copolymerized resin, polypropylene, polystyrene, or polyethylene terephthalate. Additional limits for substances extracted by *n*-hexane and xylene for polyethylene, ethylene, 1-alkene copolymerized resin, and polypropylene are also described in Appendix 1.

Clause 7 of Notification No. 295 prohibits the use of colored plastic containers to contain food, except in the following cases [3]:

- (a) laminate plastics, only the layer not coming into direct contact with food;
- (b) plastics used for containing fruits with peel;
- (c) containers made of reused plastic, for which approval has been obtained for containing fruits with peel.

The regulation prohibits recycling of certain food containers.

Use of a container which has previously been used to pack or wrap a fertilizer, poisonous substance or substance likely to be harmful to health as a food container is prohibited.

Table 20.1 Qualities and standards for plastics.

Type of plastic <sup>a)</sup>	Maximum level (Milligram per 1 Kilogram)											Plastic used for containing milk or milk product which type of plastic on the contact side are:			
	Polyvinylchloride	Poly ethylene Polypropylene	Polystyrene	Polyvinylidene chloride	Polyethylene terephthalate	Polycarbonate	Nylon (pa)	Polyvinyl alcohol	Polymethy methacrylate	Polymethyl pentene	Melamine	Polyethylene or Ethylene 1-alkene copolymerized resin	Poly propylene	Polystyrene	Polyethylene terephthalate
Detail															
(1) Lead	100	100	100	100	100	100	100	100	100	100	100	-	-	-	100
(2) Heavy metal (calculated as lead)	-	-	-	-	-	-	-	-	-	-	-	20	20	20	-
(3) Barium	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-
(4) Dibutyltin compound	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(5) Cresyl phosphate	1 000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(6) Vinyl chloride monomer	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(7) Volatile substance; toluene, ethylbenzene, isopropylbenzene, normal propylbenzene and styrene	-	-	5 000 – 2 000 <sup>b)</sup>	-	-	-	-	-	-	-	-	-	-	1 500	-
(8) Vinylidene chloride	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-
(9) Arsenic	-	-	-	-	-	-	-	-	-	-	-	2	2	2	-
(10) Extracted substance by normal hexane	-	-	-	-	-	-	-	-	-	-	-	26 000	55 000	-	-
(11) Substance dissolv in xylene	-	-	-	-	-	-	-	-	-	-	-	113 000	300 000	-	-
(12) Bisphenol a (included phenol and p-t-butylphenol)	-	-	-	-	-	500	-	-	-	-	-	-	-	-	-
(13) Diphenolcarbonate	-	-	-	-	-	500	-	-	-	-	-	-	-	-	-
(14) Amine (tri-ethalene and tri-butylamene)	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
(15) Cadmium	100	100	100	100	100	100	100	100	100	100	100	-	-	-	100

Extracted from the “Notification of the Ministry of Public Health (No. 295) B.E. 2548 (2005).” *Remark:* do not analyze.

- a) Other types of plastics that do not determine qualities or standards shall have qualities or standards according to Food and Drug Administration.
- b) In case of use at a temperature higher than 100 °C, but the quantity of styrene shall not exceed 1000 mg/1 kg and that of ethyl benzene shall not exceed 1000 mg/1 kg.

**Table 20.2** Qualities and standards of dissemination.

Type of plastic <sup>a)</sup>	Maximum level (Milligram per 1 Cube decimeter of reagent)											Plastic used for containing milk or milk product which type of plastic on the contact side are:			
	Polyvinylchloride	Poly ethylene Polypropylene	Polystyrene	Polyvinylidene chloride	Polyethylene terephthalate	Polycarbonate	Nylon (pa)	Polyvinyl alcohol	Polymethy methacrylate	Polymethyl pentene	Melamine <sup>c)</sup>	Polyethylene or Ethylene 1-alkene copolymerized resin	Poly propylene	Polystyrene	Polyethylene terephthalate
<b>Detail</b>															
(1) Phenol	-	-	-	-	-	-	-	-	-	-	Not detect	-	-	-	-
(2) Formaldehyde	-	-	-	-	-	-	-	-	-	-	Not detect	-	-	-	-
(3) Antimony	-	-	-	-	0.05	-	-	-	-	-	-	-	-	-	0.025
(4) Germanium	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	0.05
(5) Heavy metal (calculated as lead)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
(6) Potassium permanganate used for reaction	10	10	10	10	10	10	10	10	10	10	10	5	5	5	5
(7) Residue substances which is evaporate in water (in case of foods with acidity exceeding 5)	30	30	30	30	30	30	30	30	30	30	-	-	-	-	-
(8) Residue substances which is evaporate in 4% concentrated acetic acid (in case of foods with acidity less than 5)	30	30	30	30	30	30	30	30	30	30	30	15	15	15	15
(9) Residue substances which is evaporate in 20% concentrated alcohol (in case of alcoholic foods)	30	30	30	30	30	30	30	30	30	30	-	-	-	-	-
(10) Residue substance from volatile matters in normal heptane (in case of lipid oil and food contains lipid)	150	150 30 <sup>b)</sup>	240	30	30	30	30	30	30	120	-	75 <sup>d)</sup>	-	-	-
(11) Bisphenol a (phenol and p-t-butyl phenol) extracted by water (in case of food with acidity exceed 5)	-	-	-	-	-	2.5	-	-	-	-	-	-	-	-	-
(12) Bisphenol a (phenol and p-t-butyl phenol) extracted by 4% concentrated acetic acid (in case of food with acidity less than 5)	-	-	-	-	-	2.5	-	-	-	-	-	-	-	-	-

(Continued)



Table 20.2 (Continued)

Type of plastic*	Maximum level (Milligram per 1 Cube decimeter of reagent)											Plastic used for containing milk or milk product which type of plastic on the contact side are:			
	Polyvinylchloride	Poly ethylene Polypropylene	Polystyrene	Polyvinylidene chloride	Polyethylene terephthalate	Polycarbonate	Nylon (pa)	Polyvinyl alcohol	Polymethy methacrylate	Polymethyl pentene	Melamine	Polyethylene or Ethylene 1-alkene copolymerized resin	Poly propylene	Polystyrene	Polyethylene terephthalate
Detail															
(13) Bisphenol a (phenol and p-t-butyl phenol) extracted by 20% concentrated ethanol (in case of alcoholic food)	-	-	-	-	-	2.5	-	-	-	-	-	-	-	-	-
(14) Bisphenol a (phenol and p-t-butyl phenol) extracted by normal heptane (in case of lipid oil and food contains lipid)	-	-	-	-	-	2.5	-	-	-	-	-	-	-	-	-
(15) Caprolactame	-	-	-	-	-	-	15	-	-	-	-	-	-	-	-
(16) Meta crylate	-	-	-	-	-	-	-	-	30	-	-	-	-	-	-

Extracted from the "Notification of the Ministry of Public Health (No. 295) B.E. 2548 (2005)." *Remark:* do not analyze.

- Other types of plastics that do not determine qualities or standards shall have qualities or standards according to the Food and Drug Administration.
- In case of use at temperature higher than 100 °C, analyze at a temperature of 95 °C for 30 min.
- For milk and creamy milk products.
- In case of use at a temperature higher than 100 °C.

Additional requirement in the regulation includes that the “Use of a container which is made for packing other thing which is not a food or which bears a design or any statement that may cause a misconception with respect to the material parts of the food contained therein as a food container is prohibited.”

- 3) **Notification No. 117 B.E. 2532 (1989):** Specific to feeding bottles, for storing milk, or other liquid for consumption by infants and children, which consist of bottle, lid rubber teat, and rubber teat cover. The bottle, rubber teat, rubber cover shall be clean and shall have no color contaminating the food. In case the bottle is made of plastic, the plastic shall be of polycarbonate, which can withstand boiling heat. The regulation further specifies that lead and cadmium in the plastic should be <20 ppm, and migration of heavy metals, potassium permanganate, by water or 4% acetic acid depending on the pH of milk, should be within limits specified. For bottles made of other types of plastic, approval must be obtained from the Thai FDA. The rubber teat shall withstand boiling heat and comply with limits of lead and cadmium (10 ppm each); the quantity allowed for nitrosamine is 0.01 mg/kg for bottles made of rubber. Similar to plastics, there is a limit (in mg/1 dm<sup>3</sup> of the dissemination solution) on heavy metals, phenol, formaldehyde, and residue substances that evaporate in water under dissemination.

It is worth mentioning that there are a set of industrial product standards, developed by the TISI (Thai Industrial Standard Institute) under the Ministry of Industry [4]. TISI standards provide guidelines on quality and other properties of products and related processes. TISI developed both mandatory and voluntary Thai Industrial Standards (TIS) to suit the need and the growth of industry, trade, and economy of the country. Standards are developed according to the government policy of consumer protection, industrial promotion to be competitive in world market, environmental protection, and natural resources’ preservation.

*Product certification according to TIS:* Product certification schemes of TISI consists of two types with different certification marks: voluntary certification mark and mandatory certification mark.



Voluntary TIS



TISI Mandatory

TISI standards cover a vast range of products and are not limited to food contact packaging materials. There are a few TISI standards that aim at food packaging. For example, TIS 564-2546 (2003) for ceramic ware, such as porcelain, in contact with food; TIS 17-2532 (1989) for unplasticized polyvinyl chloride pipes for drinking water services (compulsory standard); and so on. Not all the TISI standards are mandatory; for plastic packaging, only TIS 1136-2536 (1993) for cling film is compulsory. Other list of “compulsory” TISI standards can be found on the TISI web site.

According to the Thai Industrial Product Standard Act B.E. 2511 (1968), “and person who manufactures industrial products which are required by the Royal Decree to conform with the standard must produce an evidence to a competent official for inspection and receive a license from the Council. The application for a license, the inspection and the issue of a license shall be in accordance with the rules and procedure prescribed in the Ministerial Regulation.” The same seems to apply to import and sale.

#### 20.4 Conclusions

There is no provision that specifies substances that may or may not be used in food packaging (i.e., a “positive” or “negative” list) for Singapore and Malaysia. Thailand is in the process of establishing a positive list for polymers, additives, catalysts, and so on. Generally speaking, these countries require that the mentioned standards in each country’s regulations are complied with and the levels of vinyl chloride monomer, heavy metals, and other substances considered to be “hazardous” do not exceed the limits. The packaging/container is generally considered safe (e.g., clean) under these countries’ regulations provided that product standards, if applicable and compulsory, are followed.

#### References

- 1 (2005) Sale of Food Act (Chapter 283), in *Food Regulations*, Revised edition, SNP Corporation Ltd, Legal Publishing.
- 2 Ministry of Health, Malaysia, official web site [http://fsis.moh.gov.my/fqc/ReferenceBooks/ActRule.asp?FAC\\_ID=21](http://fsis.moh.gov.my/fqc/ReferenceBooks/ActRule.asp?FAC_ID=21).
- 3 Thai Food and Drug Administration web site [http://www.qmaker.com/fda/new/web\\_cms/subcol.php?SubCol\\_ID=77&Col\\_ID=14](http://www.qmaker.com/fda/new/web_cms/subcol.php?SubCol_ID=77&Col_ID=14).
- 4 TISI web site <http://www.tisi.go.th/standard/catalog.html>.