Latest Amendments to the Malaysian Standards Specifications for Palm Stearin (MS 815:2007, Amd.1:2023) and Palm Superolein (MS 1762:2004, Amd.1:2023) – An Explanation

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INTRODUCTION

Palm oil is a major contributor to the commodity industry in Malaysia. Palm oil consumption is not only limited to local consumers, but it is also being exported to other countries to support the world's edible oil demand. Basically, the trading of palm oil and its products is in agreement with the mutual business contract between the customer and the supplier. Besides that, palm oil associations such as Palm Oil Refiners Association of Malaysia (PORAM) has specified the common trading requirements (PORAM, 2011). At the national level, the Malaysian Standards (MS) specifications for palm oil and its products were developed by authorised standard body to safeguard the quality of palm oil and palm products. These standards intended as a platform for trading guidelines and to create enthusiasm for continuously producing a good quality of palm oil and palm products. The MS specifications were developed separately for palm oil and palm fractions such as palm olein, palm stearin and palm superolein, as well as for palm kernel oil and its products such as palm kernel olein and palm kernel stearin.

It is worth to highlight that MS document has received recognition when several countries such as Sri Lanka have adopted the document as their national standard for palm oil and its products. Additionally, international standard bodies such as the Codex Alimentarius have also developed their specifications based on the data generated from Malaysian palm oil and its products. Monitoring the quality of palm oil and its products is an essential activity conducted by Malaysian Palm Oil Board (MPOB) to gather information on the current performance of Malaysian palm oil. For this purpose, MPOB has initiated several series of assessments on palm oil and its products covering mills and refineries in Peninsular Malaysia, Sabah and Sarawak for data generation. The data obtained is compared to the requirements specified in the MS document and other actions which can help to improve the quality of palm oil will be conducted.

MPOB is actively involved in the development and revision of MS related to palm oil and its product. This involvement is important in order to keep abreast with the latest performance and as a commitment towards palm oil safety and quality. Recently, two amendments to MS for palm products specifications, namely palm stearin (MS 815) and for palm superolein (MS 1762), were published in August 2023. An explanation on the details of the amendments will be further discussed in this article.

PALM STEARIN - SPECIFICATION (MS 815)

Palm stearin is defined as the high melting fraction obtained from the fractionation process of Malaysian palm oil, which includes dry, detergent and solvent fractionation. In 1983, the Standards and Industrial Research Institute of Malaysia (SIRIM) has developed the first specification for palm stearin, MS 815:1983 (Malaysian Standard, 1983). In 1991, the MS was first revised by SIRIM (Malaysian Standard, 1991) and in 2007, the second revision, MS 815:2007, was published by the Department of Standards Malaysia (DSM) (Malaysian Standard, 2007). In 2023, the second revision was further amended and published by DSM (Malaysian Standard, 2023a).

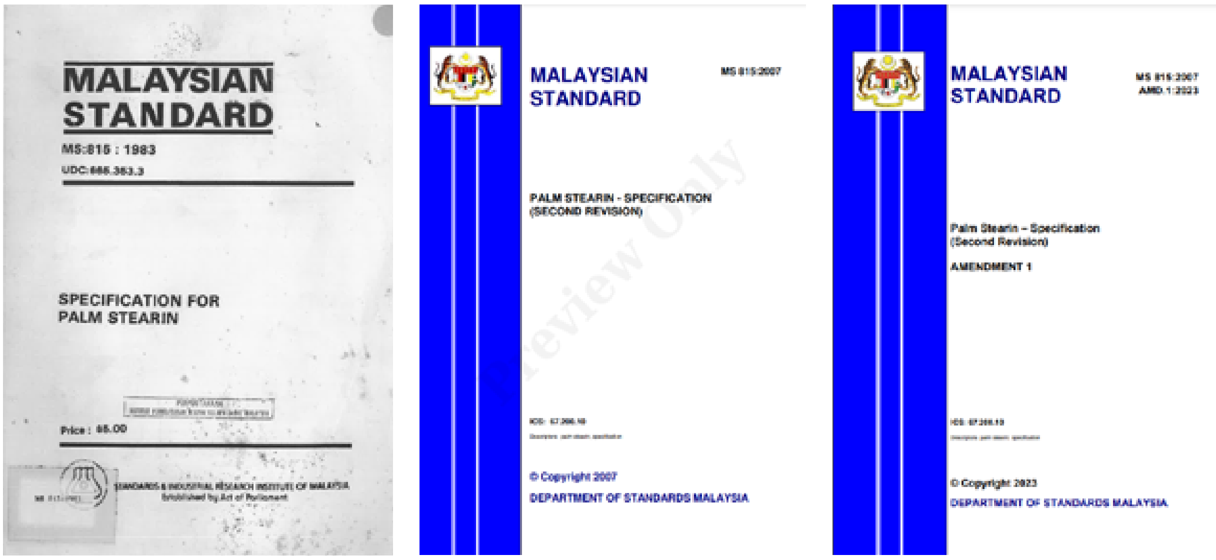

Figure 1. Development of MS 815 document.

The requirements for palm stearin as specified in MS 815 are separated into two categories, namely identity characteristics and quality characteristics. The identity characteristics aid as a guideline requirement, which include parameters as itemised in *Table 1*. The processed palm stearin and crude palm stearin owned the similar identity characteristics, with the exclusion of carotenoids content.

The quality requirements for palm stearin are mandatory for the products at the time of consignment according to the recent trade practices. The quality requirements stated in MS (*Table 2*) are similar as that outlined in the PORAM specifications (PORAM, 2015).

TABLE 1. GUIDELINE IDENTITY CHARACTERISTICS OF PALM STEARIN

Identity characteristics	Observed range
Apparent density, kg L^{-1}, at 60°C	0.8813 to 0.8844
Refractive index, n_D 40°C	1.4482 to 1.4501
Saponification value, mg KOH g^{-1} oil	193 to 205
Unsaponifiable matter, %	0.30 to 0.90
Fatty acid composition, (weight % as methyl esters)	
C12 : 0	0.1 to 0.3
C14 : 0	1.1 to 1.7
C16 : 0	49.8 to 68.1
C16 : 1	<0.05 to 0.1
C18 : 0	3.9 to 5.6
C18 : 1	20.4 to 34.4
C18 : 2	5.0 to 8.9
C18 : 3	0.1 to 0.5
C20 : 0	0.3 to 0.6
Iodine value (Wijs)	27.8 to 45.1
Slip melting point, °C	46.6 to 53.8
Total carotenoids (as β-carotene), mg kg^{-1} (for crude palm stearin only)	300 to 500

Source: MS 815:2007.

TABLE 2. QUALITY REQUIREMENTS FOR PALM STEARIN PRODUCTS

Characteristics	Product requirements			
	Crude	Neutralised	Neutralised, bleached	Refined, bleached, and deodorised/ Neutralised, bleached and deodorised
Free fatty acid (as palmitic), % max.	5.0	0.25	0.25	0.2
Moisture and Impurities, % max.	0.25	0.15	0.15	0.15
Iodine value (Wijs), max.	48	48	48	48
Slip melting point, °C, min.	44	44	44	44
Colour, 133.35 mm (5 ¼ in) Lovibond, max.	-	-	20R	3R

Source: MS 815:2007.

AMENDMENT TO PALM STEARIN SPECIFICATION (MS 815:2007, AMD.1:2023)

The amendment to MS 815:2007 was proposed by MPOB after undergo several reviews exercise. Refractive index (RI), one of the identity characteristics, is measured according to the ISO 6320 method which is applicable to animal and vegetable fats and oils (ISO, 2000). The method specifies that the measurement should be carried out at the temperature at which the oils or fats are completely melted. However, the specified temperature for RI measurement in MS 815:2007, which is set as 40°C is not rational because the minimum slip melting point of palm stearin prevails at 44°C. Palm stearin is not completely melted and homogeneous at 40°C, and therefore making it unsuitable for measurement. On the other hand, the Codex Standard CXS 210-1999 specified the RI measurement temperature for palm stearin is at 60°C.

To address this issue and harmonising both standards, a survey exercise for palm stearin assessment was conducted in 2018. Palm stearin samples were obtained from 11 refineries and three oleochemicals plants located in Peninsular Malaysia and Sarawak. The RI measurement was carried out at a temperature of 60°C and results showed that the RI of palm stearin were in the range of 1.4482 to 1.4501, with an average of 1.4486 ± 0.0003 for 141 palm stearin samples (Ahmad Bustamam *et al.*, 2022). Based on these findings, a proposal was submitted to the DSM to amend the temperature of RI measurement from 40°C to 60°C and the amended MS was published recently in August 2023 as in *Table 3*.

TABLE 3. AMENDMENTS TO REFRACTIVE INDEX TEMPERATURE FOR PALM STEARIN

Identity characteristics	Observed range
Refractive index, n_D 60°C	1.4482 to 1.4501

Source: MS 815:2007, Amd.1:2023.

PALM SUPEROLEIN - SPECIFICATION (MS 1762)

Palm superolein is defined as the liquid fraction obtained from the fractionation of Malaysian palm oil through single or multiple stage fractionation, with an iodine value (Wijs) of 60 and higher. The specification for palm superolein, MS 1762:2004 was developed in 2004 by the DSM (Malaysian Standard, 2004). In 2023, the second revision was further amended and published (Malaysian Standard, 2023b).

Table 4 consists of the identity characteristics which aid as the guideline requirement.

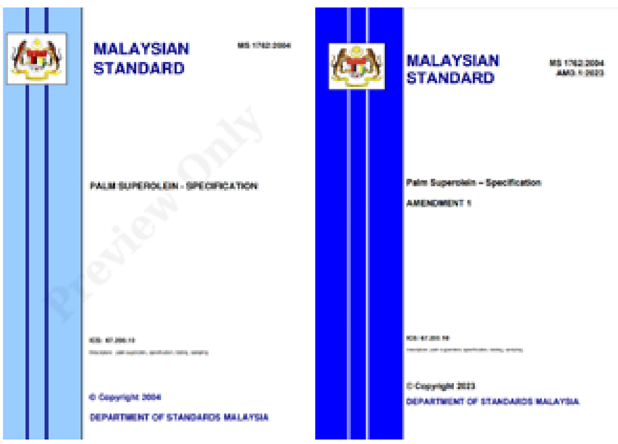

Figure 2. Development of MS 1762 document.

TABLE 4. GUIDELINE IDENTITY CHARACTERISTICS OF PALM SUPEROLEIN

Identity characteristics	Observed range
Apparent density, kg L^{-1}, at 40°C	0.9042 to 0.9054
Refractive index, n_D 40°C	1.4634 to 1.4641
Saponification value, mg KOH g^{-1} oil	181 to 191
Unsaponifiable matter, % by weight	0.31 to 0.42
Fatty acid composition, (wt % as methyl esters)	
C12 : 0	0.2 to 0.4
C14 : 0	0.9 to 1.1
C16 : 0	30.1 to 37.1
C16 : 1	0.2 to 0.4
C18 : 0	3.2 to 4.3
C18 : 1	43.2 to 49.2
C18 : 2	10.7 to 15.0
C18 : 3	0.2 to 0.6
C20 : 0	0.0 to 0.4
Iodine value (Wijs)	60.1 to 67.5
Slip melting point, °C	12.9 to 19.5

Source: MS 1762:2004.

In the MS, it is specified that the colour of the palm superolein shall be bright, clear and pale yellow within the temperature range of 35°C to 50°C, and that it shall be free from any foreign and rancid odours and tastes. The palm superolein quality requirements are as prescribed in *Table 5*.

AMENDMENT TO PALM SUPEROLEIN SPECIFICATION (MS 1762:2004, AMD.1:2023)

The proposal to amend MS 1762:2004 was initiated to align it with the revision made by Codex Standard CXS 210-1999 (2021). In 2015, several issues were reported on the nonconformity of RI and apparent density (AD) values with Codex CXS 210-1999 of exported palm superolein from Malaysia. It was discovered that the RI measured at a temperature of 40°C for palm superolein were not within the range specified in Codex CXS 210-1999, which is from 1.463 to 1.465. Consequently, a quick evaluation of Malaysian palm superolein was conducted sourcing from the identified refineries in Malaysia. The findings from the assessment revealed that the range values in Codex CXS 210-1999 for RI determination of palm superolein were applicable only when measured at a temperature of 30°C, and not at 40°C (Sulaiman *et al.*, 2022).

TABLE 5. QUALITY REQUIREMENTS FOR PALM SUPEROLEIN PRODUCTS

Characteristics	Refined, bleached and deodorised/ Neutralised, bleached and deodorised palm superolein
Free fatty acid (as palmitic), % max	0.1
Moisture and impurities, % max	0.1
Iodine value (Wijs), min	60.0
Slip melting point, °C max	19.5
Colour, 133.35 mm (5 ¼ in) Lovibond, max	3.5R

Source: MS 1762:2004.

From the previous assessment exercise, it was found that the value of RI in the MS 1762 were measured at a temperature of 30°C (Tang *et al.*, 1995). Similarly, AD values with the range of 0.897 to 0.920 g mL^{-1} as specified in Codex CXS 210-1999 for palm superolein only applicable for measurement at temperature of 30°C. For that reason, a proposal was submitted to the Codex Committee Fats and Oils (CCFO) to amend the ranges using the values obtained from the recent palm superolein survey and the proposal was accepted in 2019 (Hishamudin *et al.*, 2020). In parallel with these changes, MS 1762 was also amended following the range accepted in CXS 210-1999. The new ranges were established for the measurement of RI and AD at a temperature of 40°C, as specified in *Table 6*.

TABLE 6. AMENDMENTS TO APPARENT DENSITY AND REFRACTIVE INDEX FOR PALM SUPEROLEIN

Identity characteristic	Observed range
Apparent density, g mL^{-1}, at 40°C	0.886 to 0.900
Refractive index, n_D 40°C	1.459 to 1.460

Source: MS 1762:2004, Amd.1:2023.

ADDITION OF PROCESS-DEVELOPED CONTAMINANT LEVELS IN SUPPLEMENTARY

The consumer's concern on food safety needs to be addressed, as the presence of contaminants above the allowable level will possess a higher risk for human consumption. The European Union (EU) has set the maximum limit of 3-monochloropropanediol esters (3-MCPDE) and glycidol esters (GE) in refined palm oil and its fractions at 2.5 ppm and 1.0 ppm, respectively. As the Malaysia's effort to address the prevalence of these contaminants, an informative table was included in the MS as additional recommendations for palm stearin and palm superolein. The details are listed in *Table 7*.

The rationale for this additional recommendation is to bring attention to the Malaysian palm oil industry on the importance of managing the presence of contaminants in their products are within the acceptable ranges, and subsequently to reflect the commitment to embrace food safety and quality. Although these additional recommendations are not a compulsory requirements, it is useful to monitor the level of these process contaminants in our palm products so that they can comply with the food safety and quality standards not only to EU, but also other importing countries.

CONCLUSION AND THE WAY FORWARD

The quality of Malaysian palm oil requires continuos monitoring to safeguard and ensure the requirements set by all relevant regulatory bodies are fulfilled. The specifications for palm oil and its products should improve continuously, with parallel to the growths and enhance in good palm oil processing system. The latest amendments have become pivotal as they facilitate the palm oil industry in addressing disputes related to the identity characteristics of palm oil and its products. The development of advanced technology and comprehensive understanding will also drive the MS specifications to be tighten and mandated so that Malaysia can be recognised as a premium palm oil producer. Besides specification for palm stearin and palm superolein, currently the development on the inclusion of recommendation's level for process contaminants, 3-MCPDE and GE for palm kernel oil and its products, *i.e.* palm kernel olein and palm kernel stearin are in progress.

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TABLE 7. ADDITIONAL RECOMMENDATIONS FOR PALM PRODUCTS

Process contaminant	Refined, bleached and deodorised palm superolein/ Neutralised, bleached and deodorised palm superolein	Refined, bleached and deodorised/ Neutralised, bleached and deodorised palm stearin
3-monochloropropane-1,2-diol esters (3-MCPDE), ppm max	2.5	2.5
Glycidyl esters (GE), ppm max	1	1

Source: MS 815:2007, AMD.1:2023 and MS 1762:2004, AMD.1:2023.

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