



SIRIM QAS INTERNATIONAL

**PENSIJILAN & PENGUJIAN
FILEM PENGHADANG HABA
KENDERAAN**

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PEMINDAHAN HABA

KONSEP ASAS, KAEDAH,
SINARAN

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(KHUSUS), SAIZ SAMPEL, MARKING

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PROSES PENSIJILAN

SKIM, PERMOHONAN, BATCH
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CERTIFICATION (5)

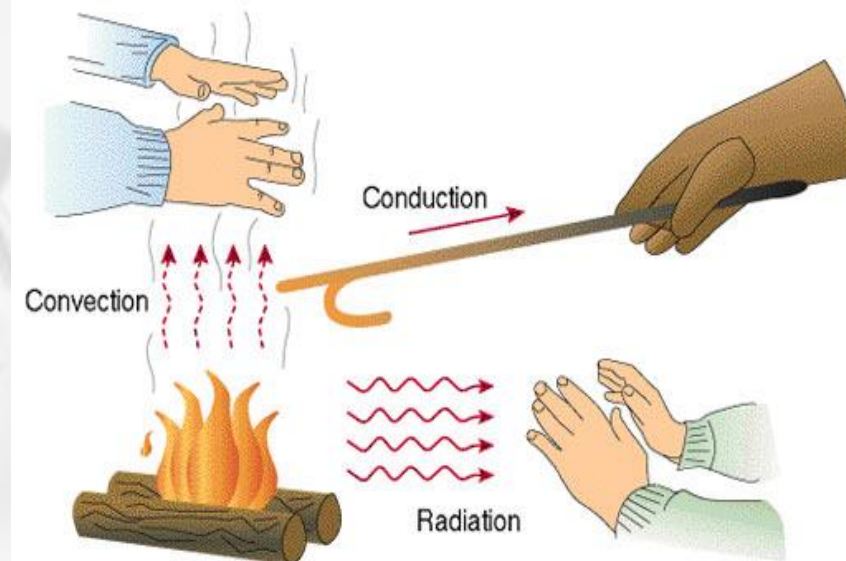
FILEM PENGHADANG HABA



PEMINDAHAN HABA – KONSEP ASAS

Heat transfer is a movement of thermal energy from hot objects/conditions to cooler objects/conditions

Heat transfer occurs by means of Conduction, Convection, and Radiation



Conduction

Energy is transferred by direct contact.



Convection

Energy is transferred by the mass motion of molecules.

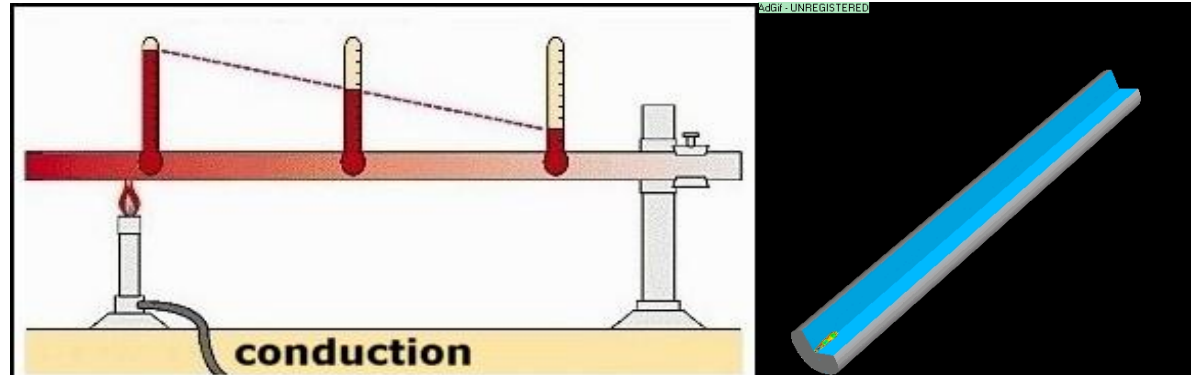


Radiation

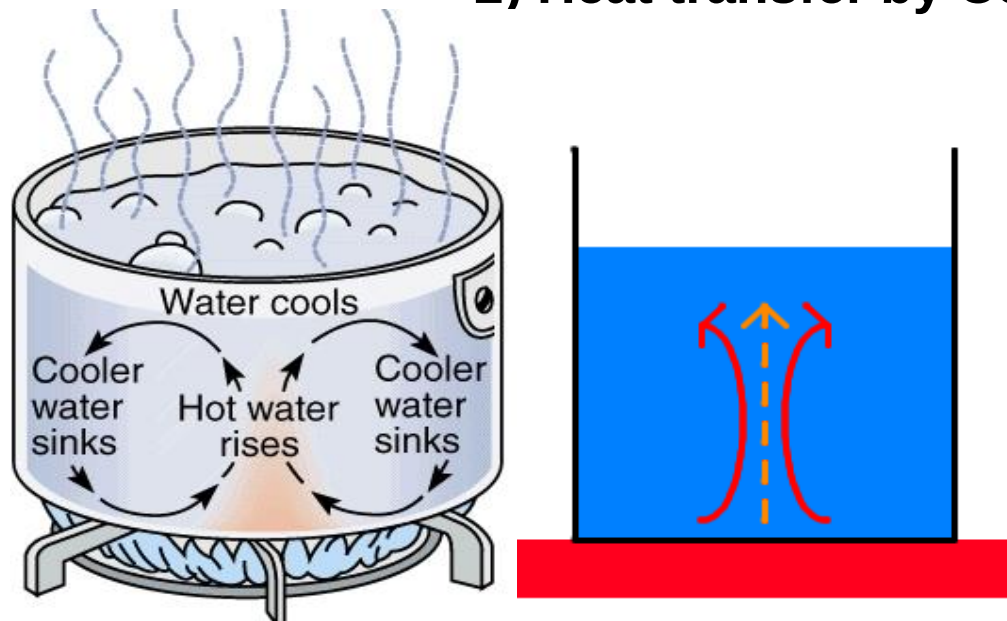
Energy is transferred by electromagnetic radiation.



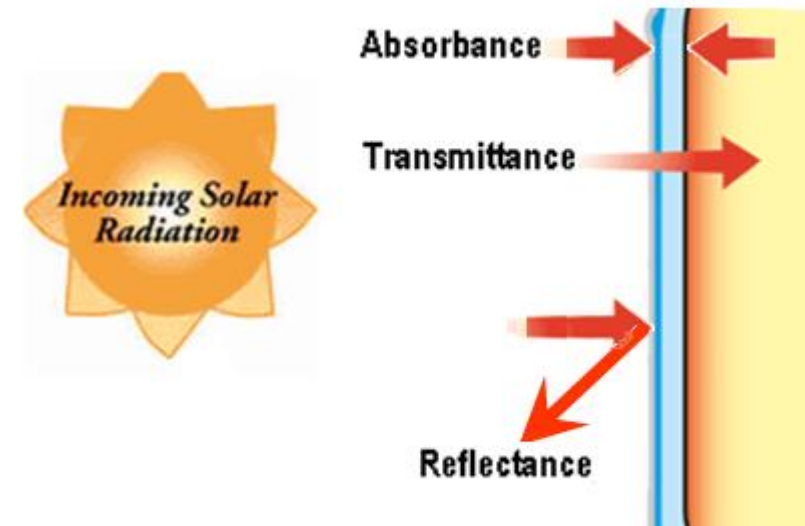
PEMINDAHAN HABA - KAEDAH



1) Heat transfer by Conduction



2) Heat transfer by Convection



3) Heat transfer by Radiation

PEMINDAHAN HABA - SINARAN

EQUIPMENT:

- ☐ UVVISNIR Spectrophotometer

REFERENCE

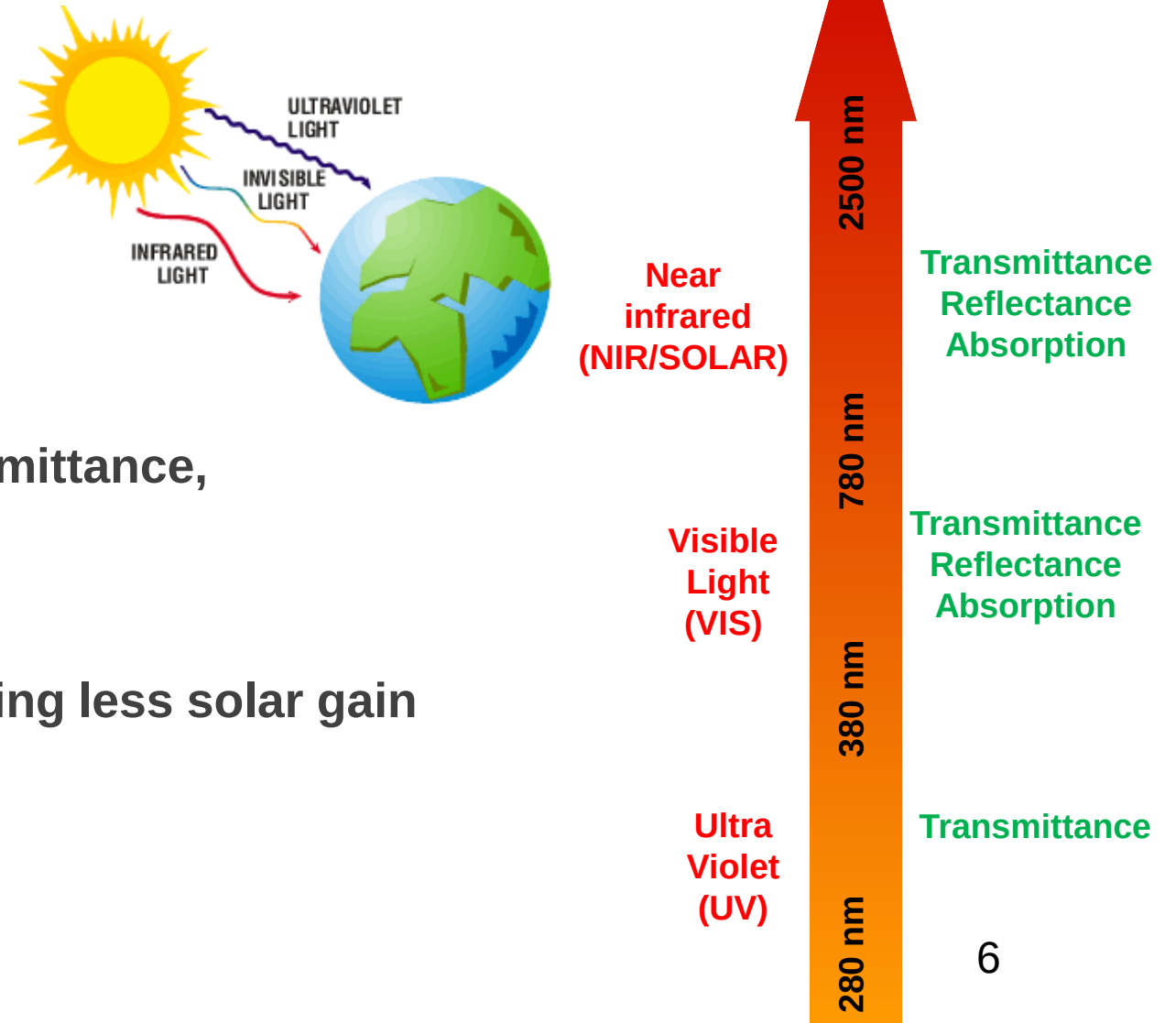
- ☐ ISO 9050: 2003

SCOPE OF TESTING

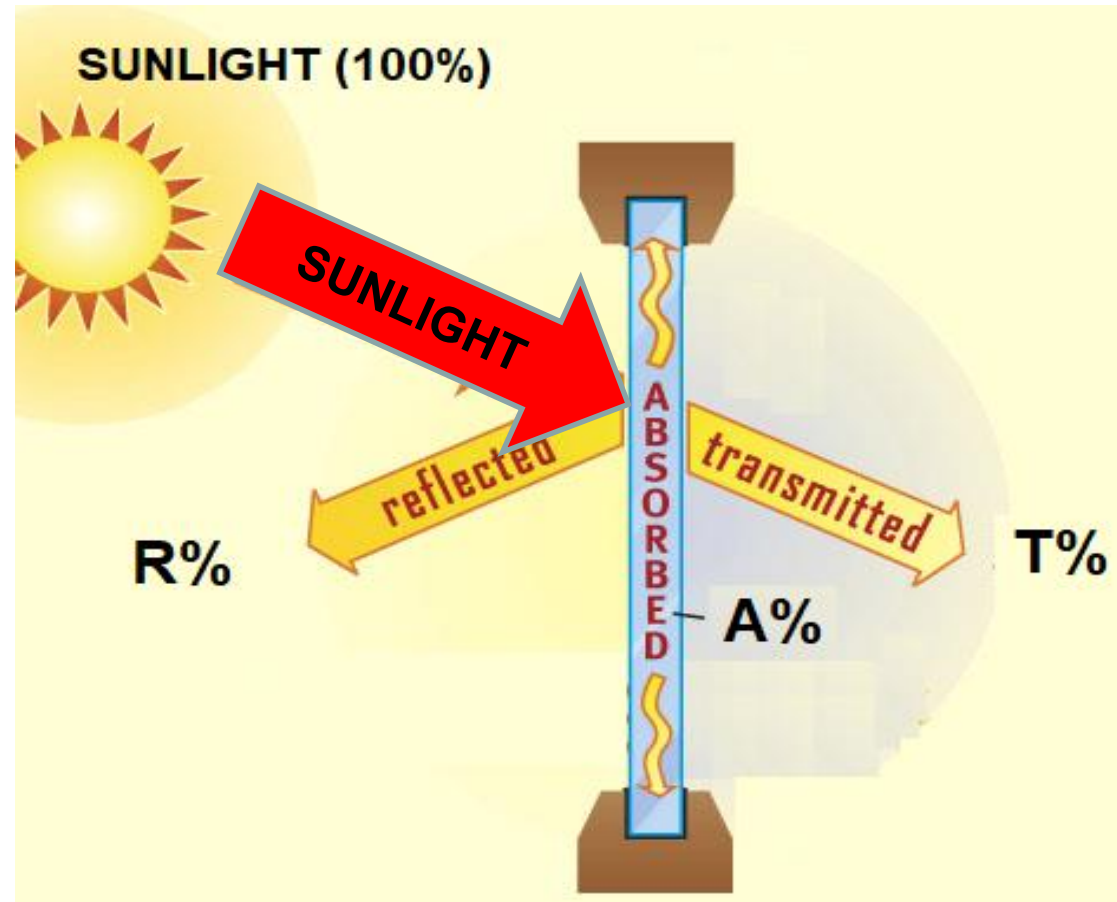
- ☐ Measurement of UV – VIS – NIR Transmittance, Reflectance & Absorbance
- ☐ Calculation of Solar Factor (SF)
 - Solar Factor values ranges from 0 to 1, a lower value of Solar Factor representing less solar gain

SAMPLE SIZE :

- ☐ 50 mm square to 120 mm square
- ☐ Maximum Thickness : 50 mm



TRANSMIT, REFLECT & ABSORB



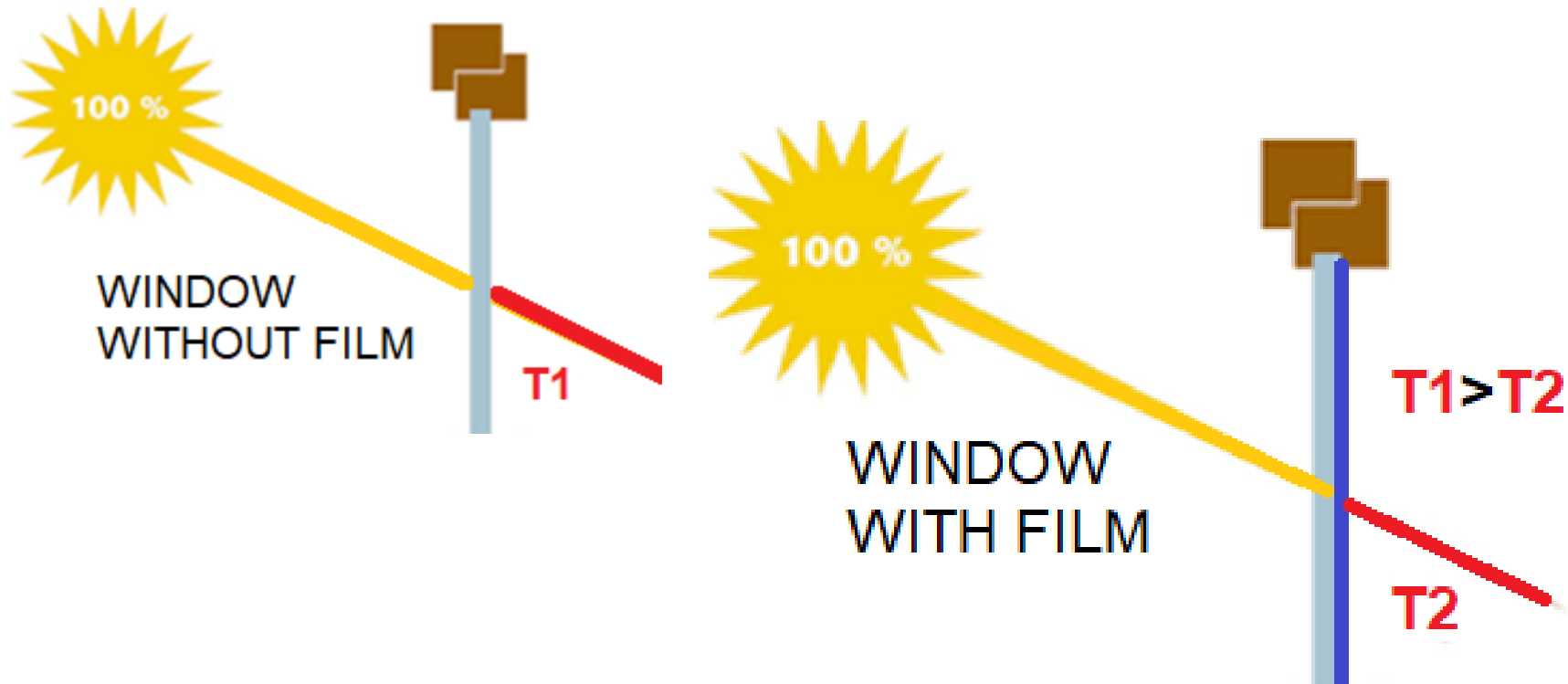
$$\begin{aligned} \text{SUNLIGHT (100\%)} \\ = T\% + R\% + A\% \end{aligned}$$

SOLAR FACTOR

$$SF = T + \left\{ A \frac{h_i}{h_e + h_i} \right\}$$

FILEM PENGHADANG HABA

Pemasangan filem penghadang haba, secara amnya akan mengurangkan penembusan sinar cahaya



FILEM PENGHADANG HABA

Peranan utama filem penghadang haba ialah mengurangkan jumlah transmisi cahaya nampak (VLT), near infrared dan ultraviolet (UV) masuk ke dalam kenderaan



Source: <https://gulfsouthcustoms.com/window-tint>

FUNGSI FILEM PENGHADANG HABA



JENIS-JENIS **KECACATAN**

- Gelembung udara



- Berkabus dan kabur
(selepas jangka masa yang tertentu)



JENIS-JENIS KECACATAN

- Tidak berkesan dalam mengurangkan pemindahan haba ke dalam kabin kereta



TEMPERATURE: **81°** | **100°**
Outside Inside

Your car's internal temperature can increase by 19° F in only 10 minutes.

STANDARD & PENGUJIAN



MALAYSIAN STANDARD

MS 2669:2017,
AMD. 1:2018

Tint film on glazing of road vehicles -
Methods and requirements of light
transmittance, ultraviolet transmittance, total
solar energy transmittance and other related
factors

AMENDMENT 1

ICS: 43.020

Descriptors: tint film, road vehicle, test method, visible light transmittance, ultraviolet transmittance, total
solar energy transmittance

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DEPARTMENT OF STANDARDS MALAYSIA

PENGENALAN STANDARD

STANDARD	SKOP STANDARD	PRODUK
MS 2669 : 2017 “Tint film on glazing of road vehicles.”	Standard ini mengandungi kaedah ujian dan spesifikasi bagi “Visible Light Transmittance” , “ultraviolet transmittance”, “total solar enery transmittance” dan beberapa spesifikasi lain.	 Filem penghadang haba

JENIS-JENIS UJIAN

UJIAN	RUJUKAN	OBJEKTIF
SOLAR PERFORMANCE - UV TRANSMITTANCE - VL TRASMITTANCE - SOLAR FACTOR	ISO 9050	To determine the product capability to prevent heat transmittance by radiation
WEATHERING TEST (DURABILITY) - 1000 HOURS ULTRAVIOLET RAY EXPOSURE	MS 2397 & UNR 43	To determine the product durability after 1000 hours expose to the ultraviolet ray
THERMAL TEST (ADHESIVE QUALITY) - BOIL TEST, or - BAKE TEST	MS 595, UNR 43 MS 1498, ANSI Z97.1	To determine the tint film capability to withstand high temperatures without its appearance becoming substantially altered.

KLASIFIKASI BERDASARKAN KEPADA UV TRANSMITTANCE & SOLAR FACTOR

TESTING	CLASS	REQUIREMENTS	RANGE	
ULTRA VIOLET TRANSMITTANCE	A	$\leq 0.50\%$	300 nm – 380 nm	ULTRAVIOLET PREVENTION
	B	0.51% - 1.5%		
	C	1.6% - 2.0%		
TOTAL SOLAR ENERGY TRANSMITTANCE (SOLAR FACTOR)	1	$\leq 0.50\%$	300 nm – 2500 nm	HEAT INSULATION
	2	0.51% - 0.61%		
	3	0.62% - 0.75%		

VISIBLE LIGHT TRANSMITTANCE (VLT)

Spectrum range of 300-780 nm

Sample : Tint film

Size : 50 mm x 50 mm

Calculation

$$VLT_c = \frac{VLT_f \times VLT_g}{100}$$

VLT_f = VLT for tint film; VLT_g = VLT for glass.

VLT_c = VLT for combination of glass and tint film

Evaluation of Results (Kaedah Kaedah Kenderaan Motor (Larangan Mengenai Jenis-Jenis Kaca Tertentu) 1991 pindaan 5 Feb 2016) **(Pindaan 8 Mei 2019)**

LOCATION	VLT _c REQUIREMENTS
Windscreen	Minimum 70 %
Front Side Windows	Minimum 50 %
Other Windows	-

MINIMUM VLT REQUIREMENTS (8/05/19)

PERATURAN PENGGUNAAN CERMIN GELAP PERATUS KETELUSAN CAHAYA (VLT)



UJIAN – PENDEDAHAN ULTRAVIOLET

To expose the sample under UV rays for 1000 hours

Sample : Film applied on 6 mm glass
Size : 100 mm x 50 mm x 3 pieces

Procedure:

- ✓ Cured at least 14 days
- ✓ Before irradiation, measure the VLT
- ✓ Irradiate under glass mercury lamp (750±50) watt
- ✓ Remeasure the VLT after irradiation completed

Evaluation of Results

- ✓ VLT difference shall not more than 4%
- ✓ No other defects – delamination, discoloration



UJIAN – THERMAL

I) Boil Test

Sample : Film applied on 6 mm glass
Size : 300 mm x 300 mm x 3 pieces

Procedure:

- ✓ Cured at least 14 days
- ✓ Sample shall be immersed vertically into the water
- ✓ Boil the water gradually to 100 °C, then hold for 2 hours

Evaluation of Results

- ✓ No bubbles
- ✓ No other defects – delamination, discoloration



UJIAN – THERMAL

I) Bake Test

Sample : Film applied on 6 mm glass

Size : 300 mm x 300 mm x 3 pieces

Procedure:

- ✓ Cured at least 14 days
- ✓ Sample shall be placed in the preheated chamber
- ✓ Set the chamber temperature to 100 °C, then maintained it for 16 hours

Evaluation of Results

- ✓ No bubbles
- ✓ No other defects – delamination, discoloration

SAIZ SAMPEL UNTUK UJIAN

UJIAN	SAIZ SAMPEL UNTUK UJIAN
SOLAR PERFORMANCE - UV TRANSMITTANCE - VL TRASMITTANCE - SOLAR FACTOR	A4 SIZE (just film)
WEATHERING TEST (DURABILITY) - 1000 HOURS ULTRAVIOLET RAY EXPOSURE	100 mm X 50 mm X 4 PCS (applied on 6 mm clear glass) - 14 days conditioning
THERMAL TEST (ADHESIVE QUALITY) - BOIL TEST, or - BAKE TEST	300 mm X 300 mm X 4 PCS (applied on 6 mm clear glass) - 14 days conditioning

KEPERLUAN MARKING

Setiap gulungan film penebat haba perlu memiliki maklumat seperti berikut

- a) Nama produk;
- b) Nombor model;
- c) Klasifikasi produk i.e. Class A1, Class A2, Class A3, Class B1, Class B2, Class B3, Class C1, Class C2 or Class C3;
- d) Lokasi Penggunaan i.e windscreen, front side windows and other windows;
- e) Tarikh pengeluaran
- f) Nama pengilang dan tanda niaga
- g) Ketebalan nominal
- h) Logo pensijilan





PROSES PENSIJILAN

SKIM PENSIJILAN

2 JENIS SKIM PENSIJILAN

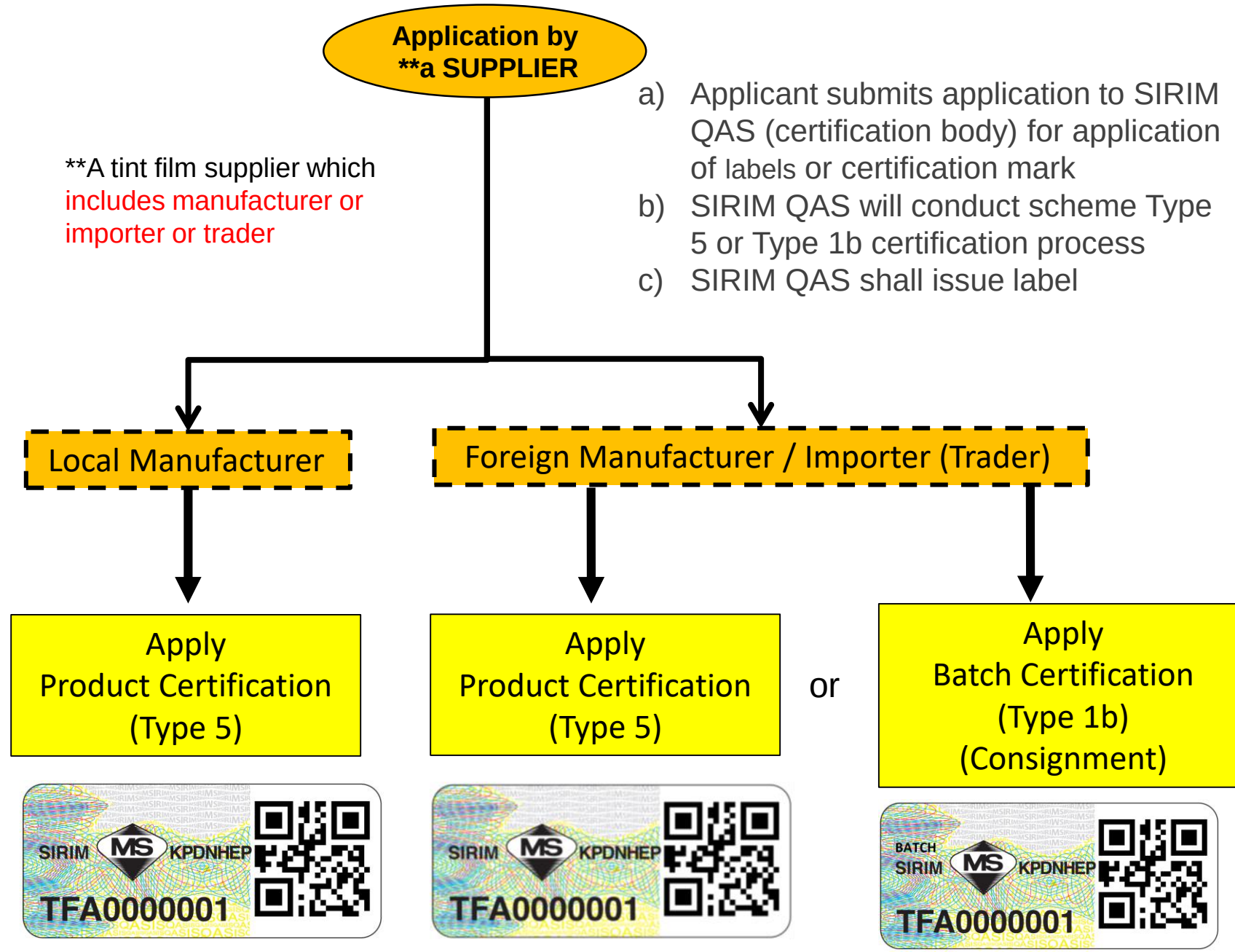
TYPE 5

- Pensijilan jangka panjang
- Lesen diperbaharui setiap tahun
- Audit akan dibuat dikilang

TYPE 1B

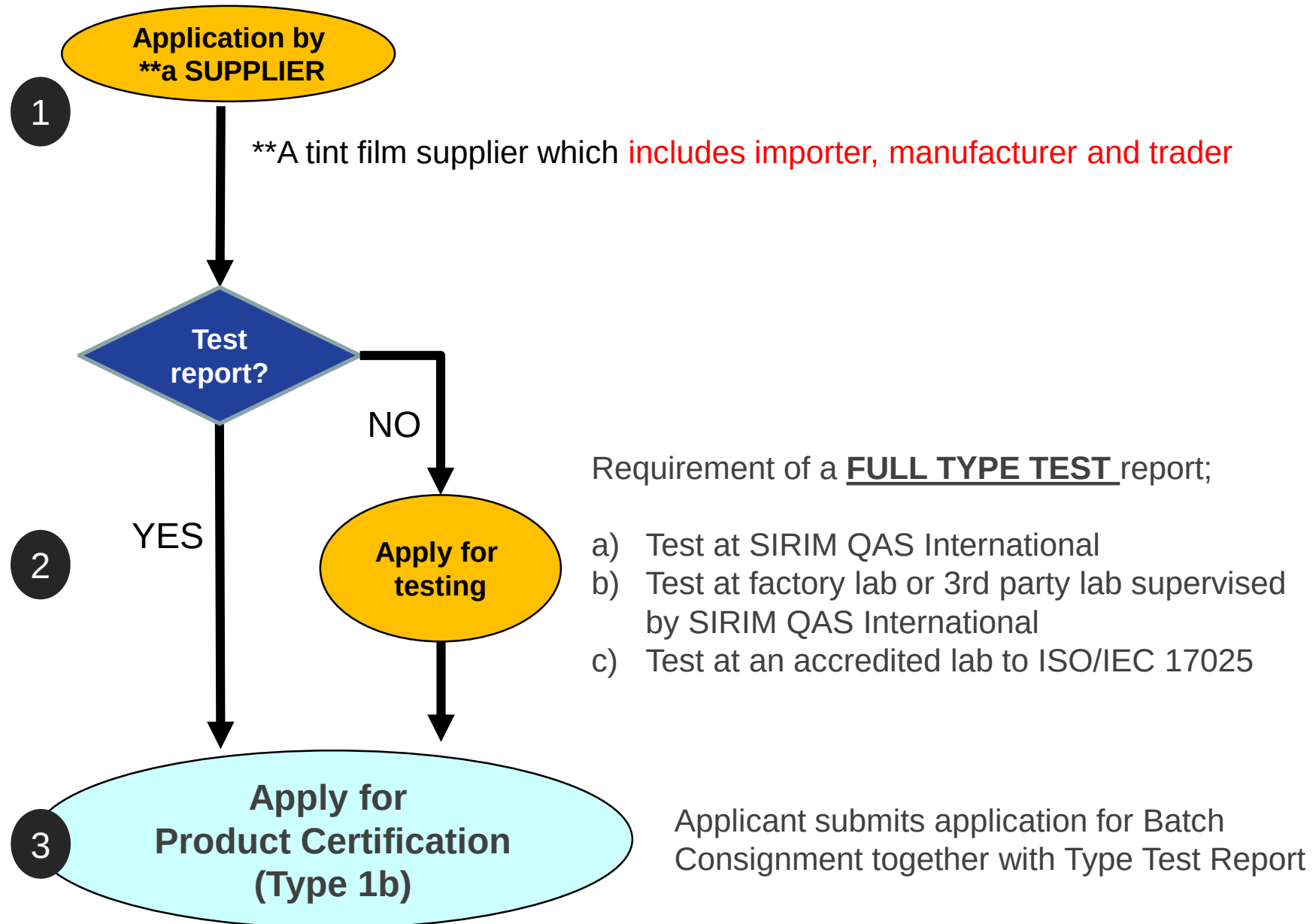
- Pensijilan secara batch konsainmen sahaja
- Lesen dikeluarkan pada spesifik batch yang diuji sahaja
- Tiada audit dikilang

PERMOHONAN UNTUK PENSIJILAN

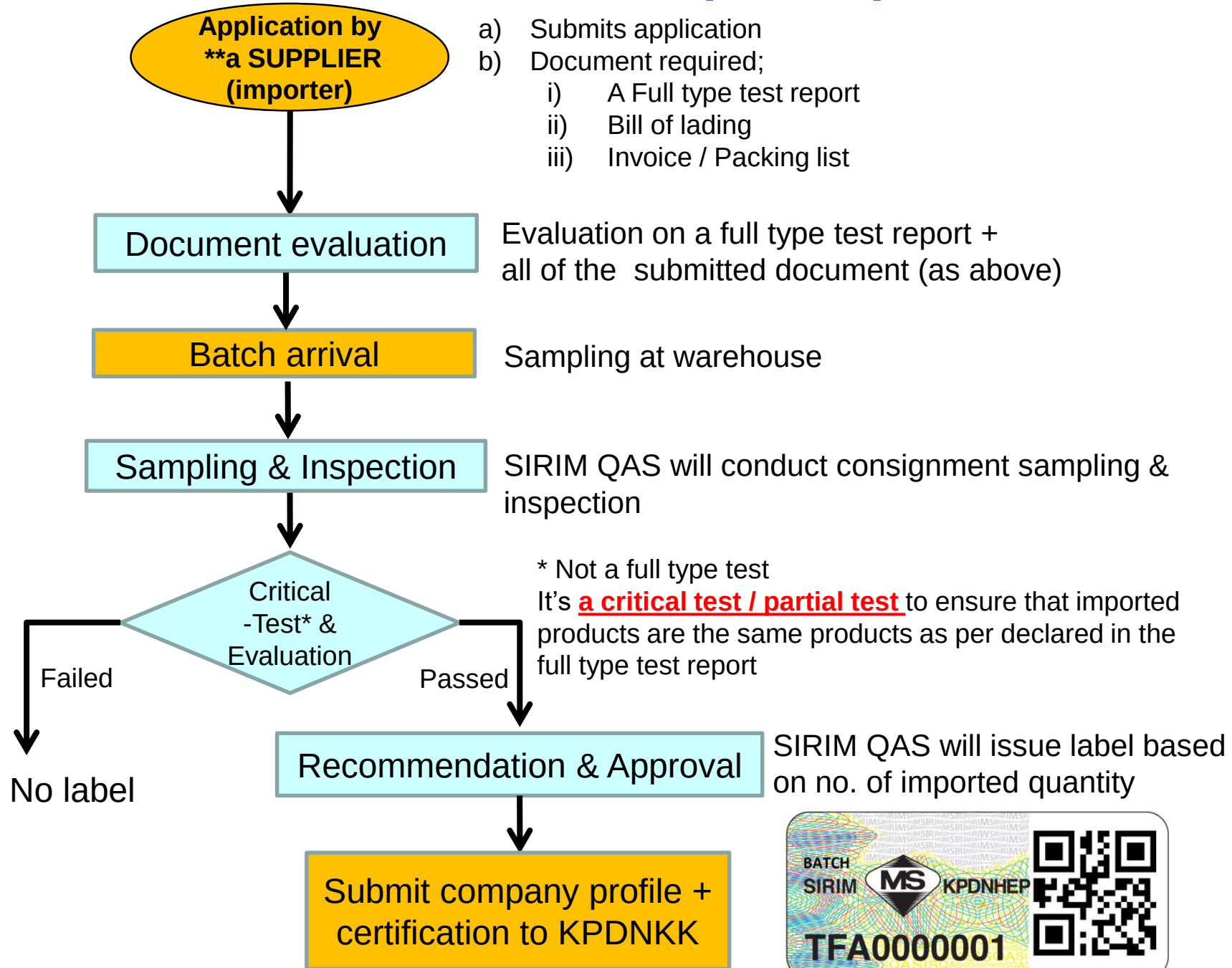


BATCH CERTIFICATION PROCESS TYPE 1B (CONSIGNMENT)

PERMOHONAN 'TYPE TEST'

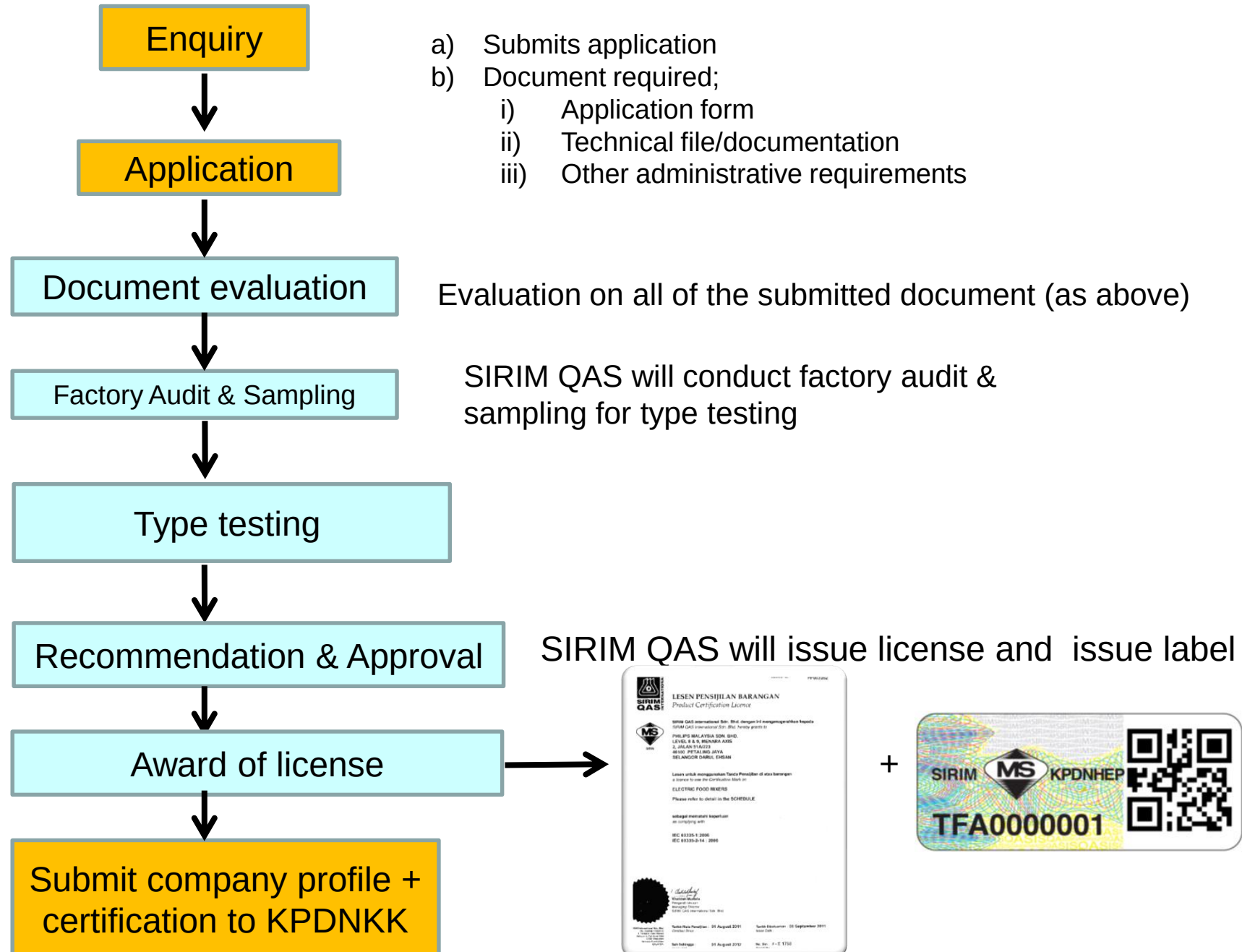


PROCESS FLOW : BATCH CERTIFICATION SCHEME (TYPE 1b)



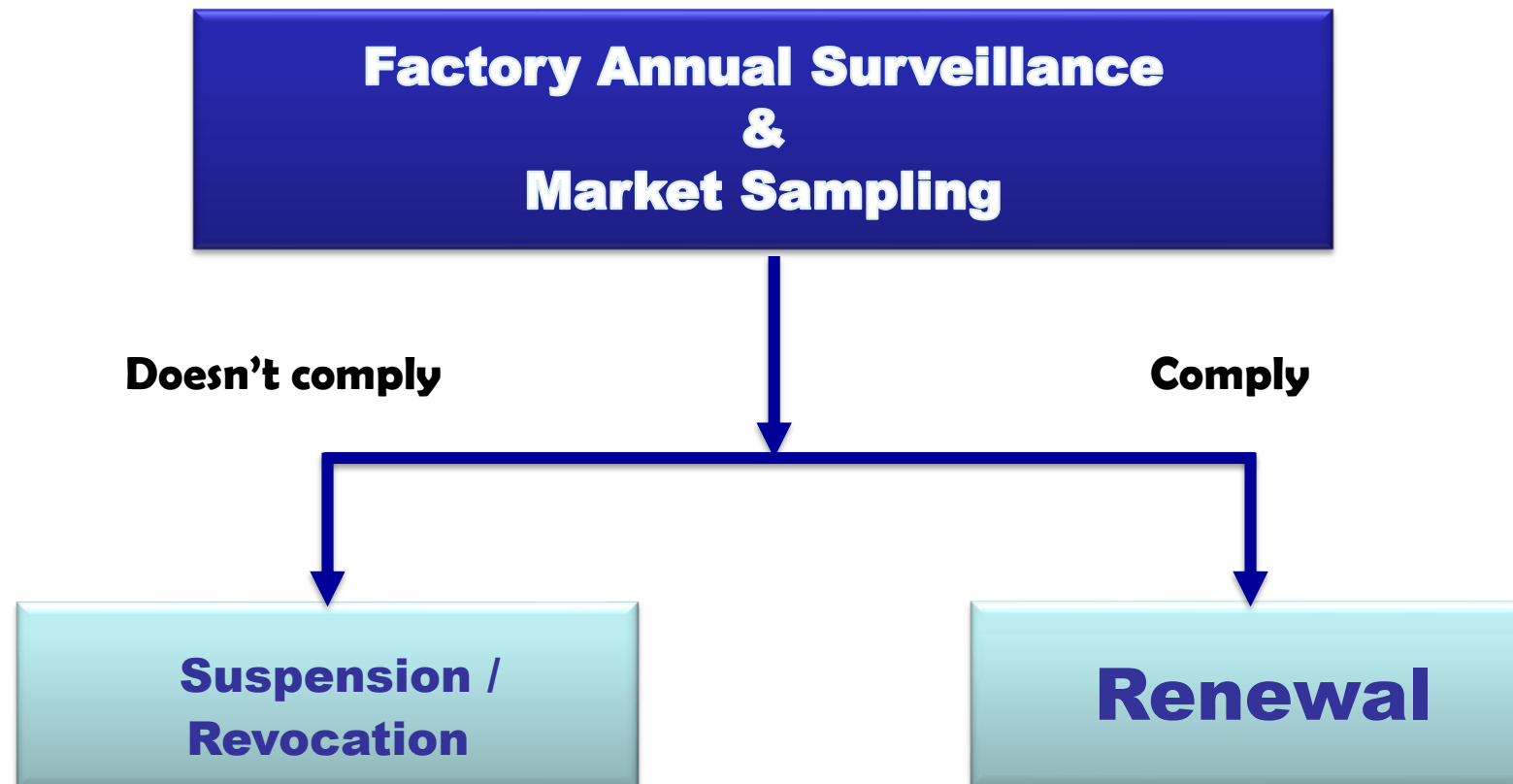
PRODUCT CERTIFICATION PROCESS (TYPE 5)

PROCESS FLOW : PRODUCT CERTIFICATION SCHEME (TYPE 5)

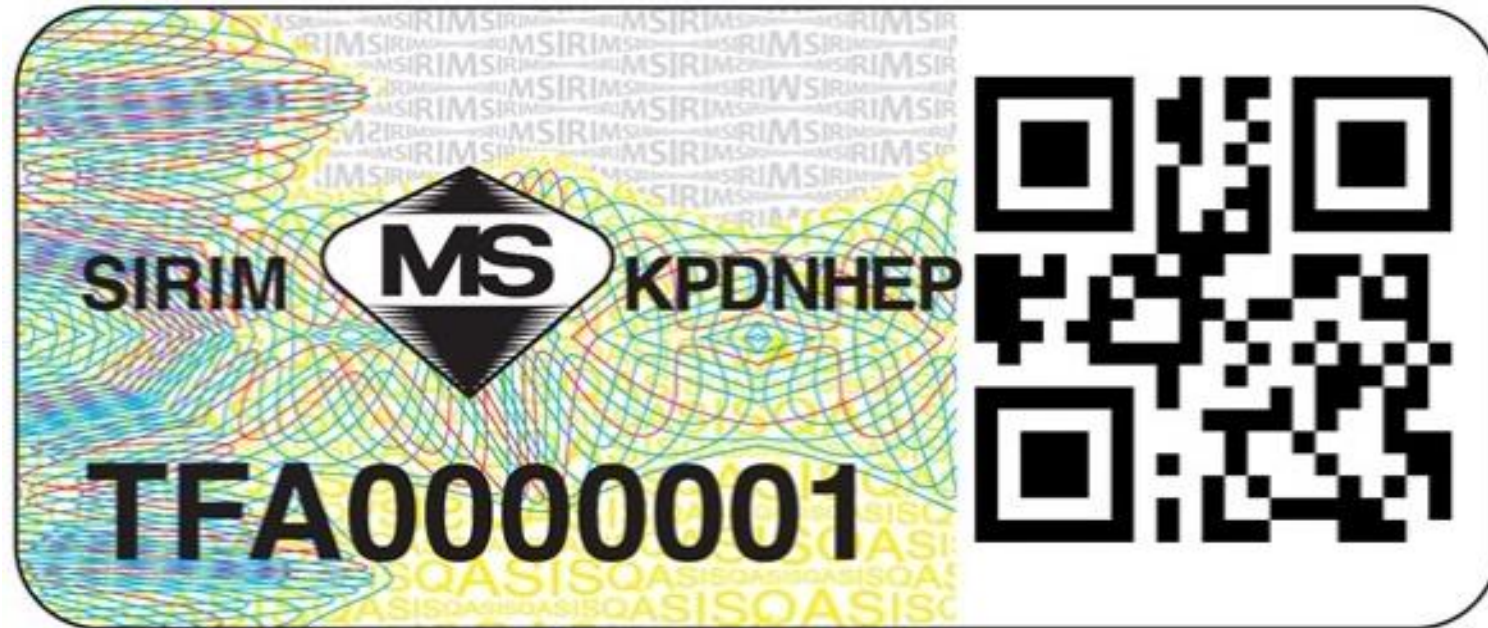


PROCESS FLOW : PRODUCT CERTIFICATION SCHEME (TYPE 5)

- Surveillance and Renewal process



PRODUCT LICENCE & QR CODE



TF = TINTED FILM

A0000001 = running no.

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