SIRIM QAS International Sdn Bhd

TESTING AND CERTIFICATION ON ELECTRICAL CABLE TESTING

28th Aug 2018

Presentation Outline

1. Introduction
2. Our roles & services
3. Procedure & standard requirement for electrical cable testing
4. Product Certification Scheme

About Us

- Established in 1996 as SIRIM Berhad's wholly-owned subsidiary
- Conformity assessment services since 1970s
- Staff strength : 760
- Malaysian based, internationally recognised
- Local and international clients

Malaysia's Leading Certification, Inspection and Testing Body

Our Services

CERTIFICATION

- Management System Certification
- Product Certification
- Personnel Certification

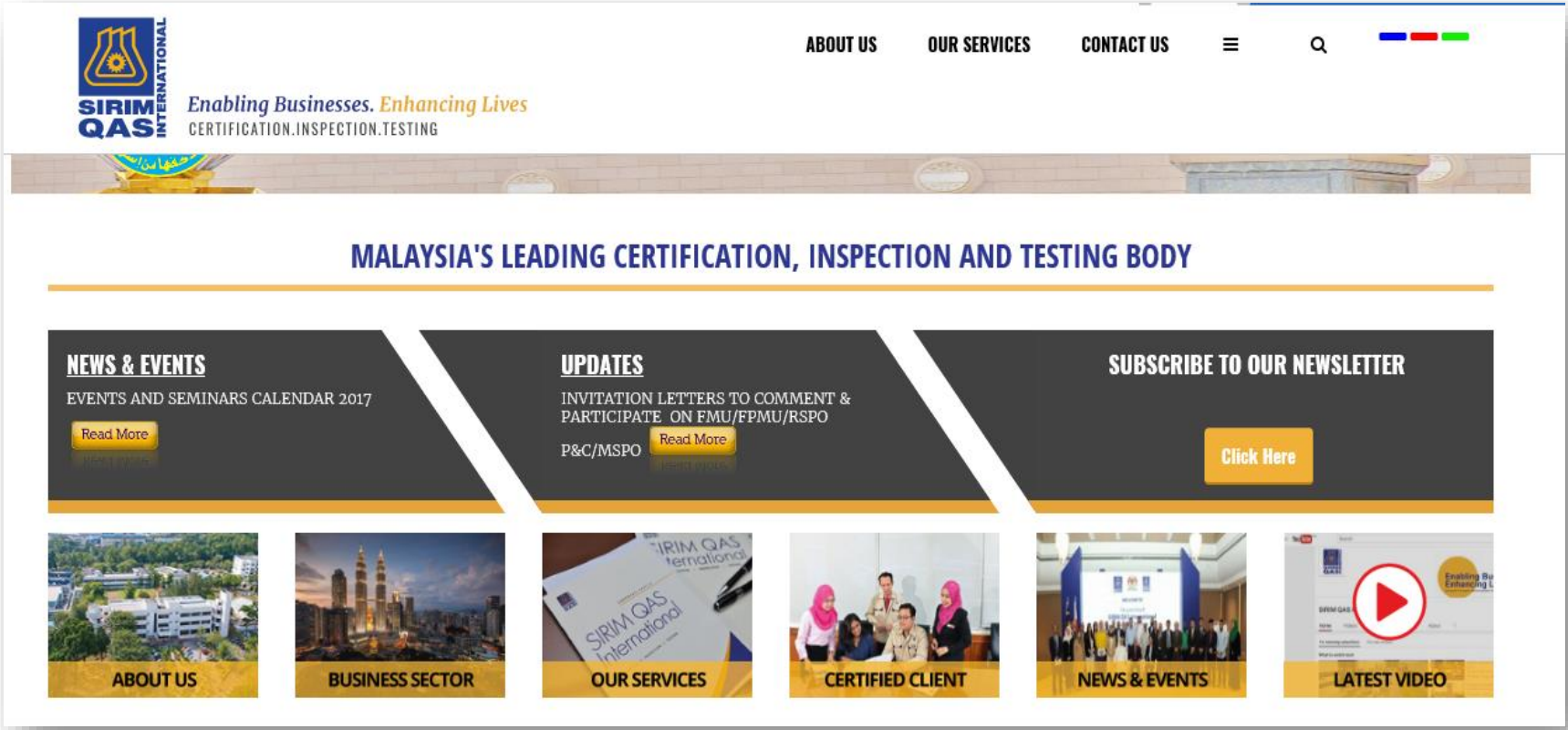
TESTING

- Product compliance testing to standards, regulatory requirements and specifications

INSPECTION

- Engineering Inspection
- Inspection on behalf of other CBs
- Other 3rd party inspections

FOR DETAILS…… http://www.sirim-qas.com.my/



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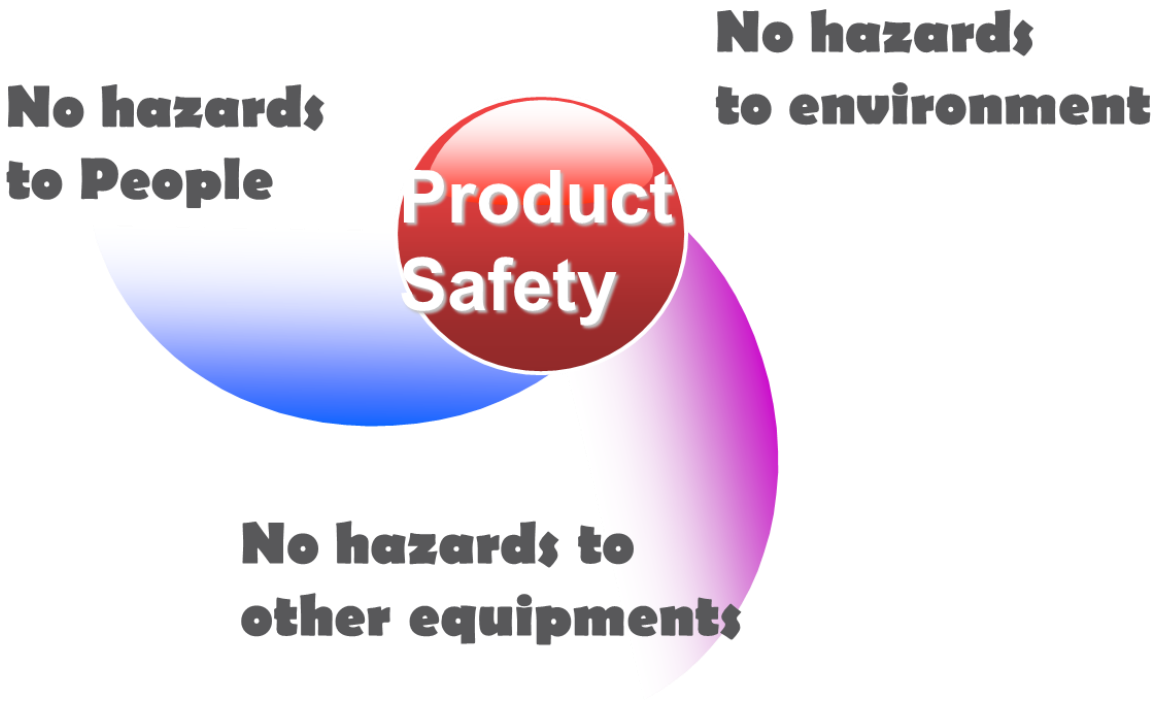
- Twitter: https://twitter.com/SIRIMQASIntl
- You Tube: https://www.youtube.com/SIRIMQASInternational
- Linkedin: https://www.linkedin.com/SIRIMQASInternational

Safety test & product safety

1) Safety Tests

to verify safety level of the appliances either meeting the relevant Standard or specification

to evaluate either the appliances would cause any danger to users and surrounding



Cable Testing:
Procedure & standard requirement

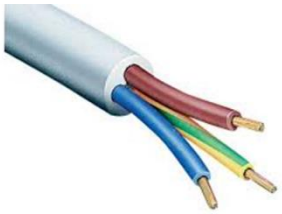
Type of cables

- Low voltage cables up to 1 kV
- Medium voltage cables up to 33 kV
- Submarine cable up to 175 kV
- PVC insulated, XLPE insulated, paper impregnated
- Aluminium conductor for transmission line
- Communication cables and fiber optic
- Automotive cables
- Housing cable
- Flexible cable for appliance

HV Cable

-Aerial Bundled Cable

Housing cable



Flexible cable

General

- There are a few types of cables used in Malaysia using different standards

Type of cables	Standards	Area of usage
Flexible cords up to 500V	MS 2112-5, BS 6500, IEC 60227-5	Portable socket-outlet, household appliances, audio-video products
Housing cables up to 750V	MS 2112-1 to MS 2112-6, BS 6004	Fixed wiring and lighting
PVC insulated 600V to 1 kV	MS 2100 to MS 2111, BS 6346	Low voltage electricity supply
XLPE insulated from 1 kV to 3 kV	IEC 60502-1	Low voltage electricity supply
XLPE insulated from 6 kV to 30 kV	IEC 60502-2	Medium voltage electricity supply

Type of cables	Standards	Area of usage
XLPE insulated cable	IEC 60840	Underground transmission line 30 kV to 150 kV
Fire rated cables	IEC 60331, IEC 60332, BS 6387, IEC 61034, IEC 754	Oil and gas industry, high rise buildings
Bare conductor	BS 215, ASTM D 233	Overhead transmission line
Low frequency cables	IEC 60189, SKMM	Data and communication cables
Fiber optic cables	IEC 60794	Data and communication cables
Automotive cable	JIS or mfr spec	Cables used in automobile

Test Standards

Type of cables	MS Standards for PVC cables
Electric Cable and Wire: Polyvinyl Chloride(PVC) insulated cables of rated voltages up to and including 450/750 V	**MS 2112-1:2009 Part 1:General Requirements**
	MS 2112-2:2009 Part 2:Test Method
	MS 2112-3:2009 Part 3:Non-Sheathed Cables for Fixed Wiring
	MS 2112-4:2009 Part 4:Sheathed Cables for Fixed Wiring
	MS 2112-5:2009 Part 5:Flexible Cables
	MS 2112-6:2009 Part 6:Cables for Lift & Flexible Connections

GENERAL TEST REQUIREMENT FOR CABLE

Cables testing
In general – to ensure that they are safe and that they fit for purpose.

Basically, test requirements for cable can be divided in to a few categories;
Some requirements apply only for specific type of cables

1. **Electrical tests**
    a) **Conductor resistance**
    b) **Voltage test – on insulation & sheath**
    c) **Long term stability**

2. **Mechanical (physical) test**
    a) **Tensile test**
    b) **Low temperature properties – bending / impact**
    c) **Resistance to heat – heat shock**

3. **Fire test**
    a) **Resistance to fire**
    b) **Conductor and armour wire plating thickness**
    c) **Smoke emission**

4. **Chemical test**
    a) **Halogen gas determination**
    b) **Flame retardance / propagation**
    c) **Smoke emission**

GENERAL TEST REQUIREMENT FOR CABLE (LV)

1. ELECTRICAL TESTS

a) Resistance of conductors

b) High Voltage at 1000V / 1500V / 2500V

c) Insulation Resistance at 70°C

Certification marking
&
substandard cable

Name of manufacturer

Cable's type, sizes and material

Certification mark or name of certification body

Rating

Sub-Standard Cables

- Cables which are not designed, constructed, test approved, installed or used in accordance their prescribed safety standards and specifications.

- Identity /Characteristics of a substandard cable;

1. **Undersized**
   a) conductor construction not in accordance to prescribed standards on dimensions such as;
      - » size & number of wires,
      - » thickness
      - » Length
   b) conductor does not meet the minimum cross-sectional area as determined by its specific resistance.
   c) reduced size of copper resistance

2. **Mixed content**

   Instead of pure copper – 'they' use mixed content or other metal

Sub-Standard Cables

3. **Reduced in insulation properties**

   a) insulation & protective layers construction not in accordance to prescribed standards on size, thickness or dimensions

   b) Insulation & protective layers type does not meet the required mechanical properties for long term ageing and environmental tests

4. **No identification / certification marking**

   Completed cables are not identified by markings as stipulated by the standards.

Example of sub-standard cable

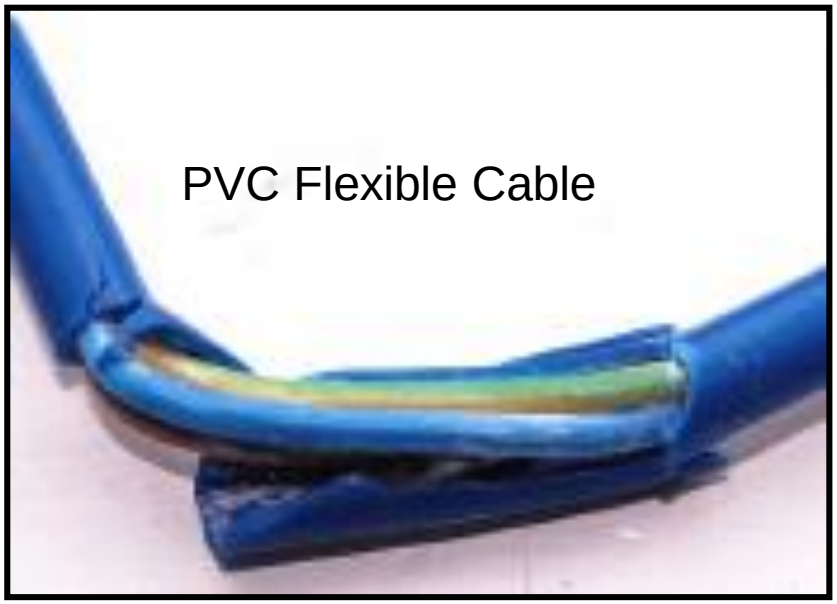
MARKING on Cable

- Marking vs No marking
  - No manufacturer’s name/trademark
  - No cable markings such as size, electrical parameters

- Marked with label / certification marked vs No label / not certified
  - Certified / Approval body not identified

- Fake labels vs proper label
  - Counterfeit

Example of sub-standard cable



Non-compliant PVC Flexible Cable

- Undersized conductor – low conductivity – 1mm^2 instead of 1.5mm^2
- Cable sheath fall apart in low temperature bend test
- No compliant with standard marked on sheath
- For fire retardant –
  - Not fire resistance –PVC insulation &PVC sheath – fails within 2 minutes instead of 30 minutes as required by standard

How to identify a sub-standard cable

1) Check and verify MARKINGS on Cable
   – shall be as per standard requirement

2) Check and verify APPROVAL / CERTIFICATION Mark/Label

3) Measure conductor resistance (need to have a proper meter)

4) Measure size(s)
   - conductor
   - each strand (and no of strands)

5) Check and verify copper content
   - normally by conductor resistance
   - weight the sample
     - Sometimes –by weighing the sample, with some experience, we can identify if the samples / weight of sample due to copper content or sheath of insulation

How can SIRIM assist?

SIRIM will always playing it's roles in providing assistance to industry & regulator in fighting issue of sub standard cable

How can we do that?–

a) through compliance testing
b) through our product certification scheme
c) through SIRIM's market surveillance activities
d) by carrying out verification testing on samples picked up from market - through enforcement & market surveillance –by Suruhanjaya Tenaga
e) by providing a support to ST & MCMA initiatives to raise the issue of sub-standard cable to the widest audience possible

Problems / Challenges

- The ability to buy cable from anywhere in the world means there remains a need for better market surveillance as some imported cable – of which are not in compliance with standard requirement
- Contractors have little interest in standards while some distributors encourage the manufacturer of `undersized cable'
- Inferior cable product is sold unmarked - making it untraceable and misuse of trade marks is common place
- No follow-up market surveillance (though is essential) to ensure future compliance.

Moving forward

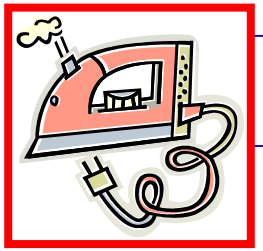
CONCLUSION

- **We all want safer cables and this can only be achieved with;**
  - **acceptance of the problem,**
  - **better monitoring and enforcement at every level of the supply chain**

APPLICATION PROCESS

Application by *a SUPPLIER

*A supplier includes importer, manufacturer and trader.



A supplier submit test application to SIRIM QAS International test lab

Submit to

SIRIM QAS International test lab performs a type test to a standard (MS / IEC Std + National Deviation(if any)

SIRIM QAS INTL TEST LAB

SIRIM QAS International test lab shall issue a full type test report

The report shall then be used for submission for a COA application with a regulatory body

PRODUCT CERTIFICATION SCHEME

Type 5 Product Certification Scheme

The International Organisation for Standardisation (ISO) and the International Electrotechnical Committee (IEC) have set out a number of different routes to conformity assessment in their document ISO/IEC 17067.

Elements of Product Certification System	Product Certification Systems						
	1a	1b	2	3	4	5	6
1) Selection (sampling) as applicable	X	X	X	X	X	X	
2) Determination of Characteristics as applicable by **testing** (ISO/IEC 17025) **inspection** (ISO/IEC 17020) **design appraisal** **assessment of services**	X	X	X	X	X	X	X
3) Review (evaluation)	X	X	X	X	X	X	X
4) Decision on Certification *Granting, maintaining, extending, suspending, withdrawing certification*	X	X	X	X	X	X	X
5) Licensing (attestation) *Granting, maintaining, extending, suspending, withdrawing the right to use certificates or marks*		X	X	X	X	X	X
6) Surveillance, as applicable a) testing or inspection of samples from the open market b) testing or inspection of samples from the factory c) quality system audits combined with random tests or inspections d) assessment of the production process or service			X	X	X X X X	X X X X	X

Product Certification Process

General Certification Process (Type 5)

No. Lesen :
Licence No.:

SIRIM QAS INTERNATIONAL

LESEN PENSIJILAN BARANGAN
Product Certification Licence

SIRIM QAS International Sdn. Bhd. dengan ini menganug
SIRIM QAS International Sdn. Bhd. hereby grants to

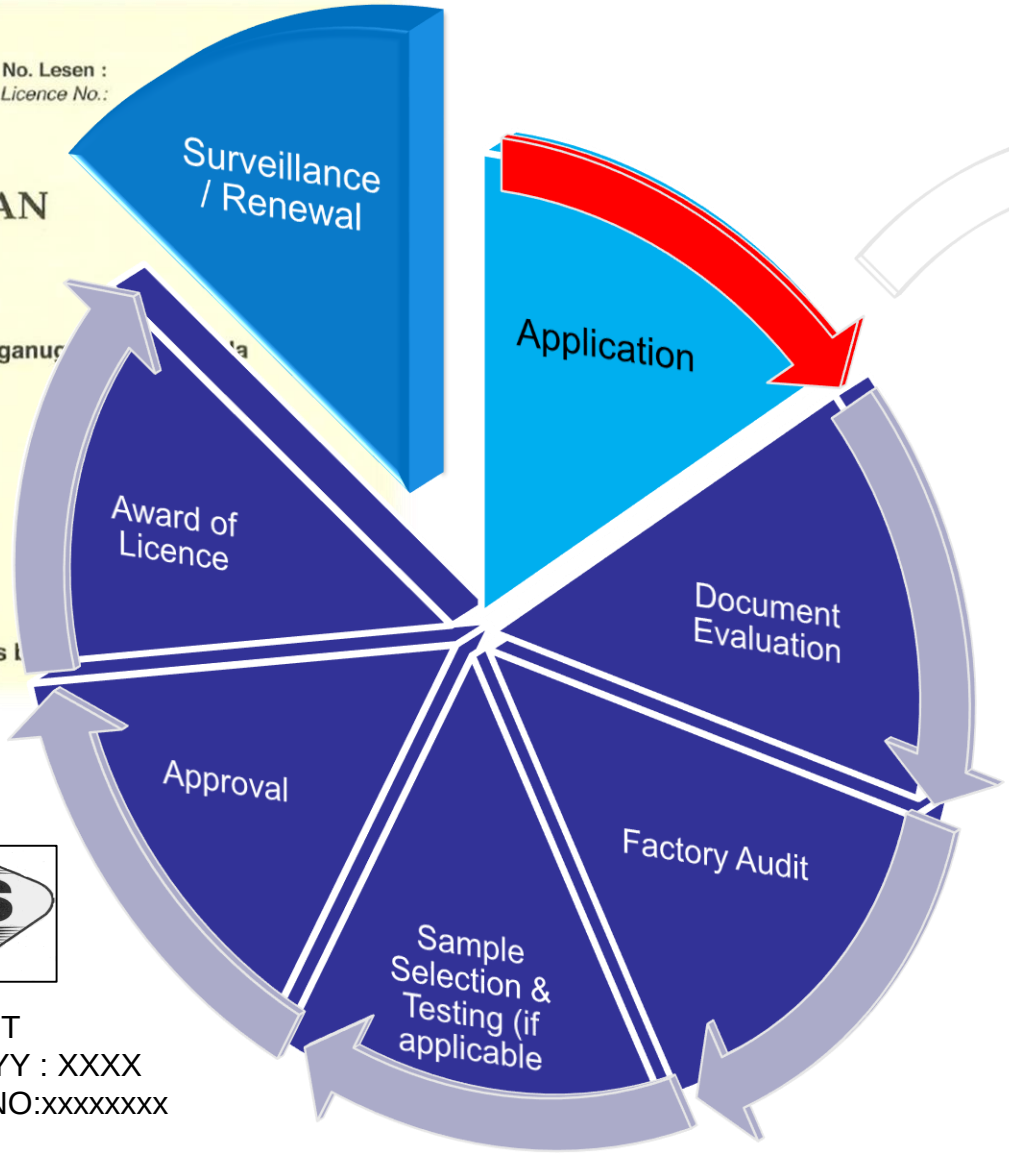
SENAI INDUSTRIAL ESTATE IV
81400 SENAI
JOHOR DARUL TAKZIM

SIRIM

STANDARDS MALAYSIA

MS ISO/IEC GUIDE 65:2000
PC 05102004 CB 01

Lesen untuk menggunakan Tanda Pensijilan di atas l
a licence to use the Certification Mark on



SIRIM-ST
CERTIFIED TO YY : XXXX
CERTIFICATION NO:xxxxxxxx

Product Certification Process

Test Standards

1) Regulated cables by ST

34	**WIRE / CABLE/ CORD (non-armoured) 0.5mm² to 35mm²**	• is unscreened and flexible ; • is designed for use at low voltage ; • consists of two or three elastomer or PVC insulated cores of multistrand construction ; • has a cross-sectional area of each conductor from 0.5mm² not exceeding 35mm²	Polyvinyl chloride (PVC) Insulated flexible cord and cable	MS 2112-5:2009	BS EN 50525-2-11:2011 or IEC 60227-5:2011
			Rubber insulated cord and flexible cables	MS 140:1987 or MS 2127-4	BS EN 50525-2-11-2011 IEC 60245-1:2008 IEC 60245-4:2011
			PVC-insulated cable (non-armoured) for electric power and supply: - non-sheathed	MS 2112-3:2009	IEC 60227-3:1997
			PVC-insulated cable (non-armoured) for electric power and supply: - sheathed	MS 2112-4:2009	IEC 60227-4:1997

2) Other cables

Test standards follow related product standards or other acceptable standards.

Product Certification Process

New Application

Application and Documents Evaluation

- Questionnaire Form (ePCS/FOR/01-1)
- Application Form (ePCS/FOR/01-2)
- Declaration of Approval from relevant authority (ePCS/FOR/01-3)*
- Declaration of Obtaining SIRIM Licence for the Purpose of Relevant Authority Approval (ePCS/FOR/01-3.1)*
- Declaration of Trade Mark (ePCS/FOR/01-4)
- Authorization Letter of Trademark/Brand Name (ePCS/FOR/01-4.1)*
- Authorization Letter of Test Report (ePCS/FOR/01-4.2)*
- Declaration from Manufacturer (ePCS/FOR/01-5)*

Note: * - whenever applicable

http://www.sirim-qas.com.my/

Product Certification Process

New Application

Application and Documents Evaluation

Type Test Report

Test Laboratory - CB Scheme

Laboratories accredited by national accreditation bodies e.g. DSM, HOKLAS, NATA, UKAS etc.

SIRIM QAS International - EEST

Laboratories listed under ASEAN EE MRA


COMMISSION (IEC)
COMMISSION ELECTROTECHNIQUE INTERNATIONALE (CEI)

IEC SYSTEM FOR CONFORMITY TESTING AND CERTIFICATION OF ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

SYSTEME CEI D'ESSAIS DE CONFORMITE ET DE CERTIFICATION DES EQUIPEMENTS ELECTRIQUES (IECEE) METHODE OC

CB TEST CERTIFICATE
CERTIFICAT D'ESSAI OC

Telephone Equipment

20 – 60 VDC, 20 W

N/A

PUBLICATION EDITION

Product Certification Process

New Application

Product and Quality System Evaluation

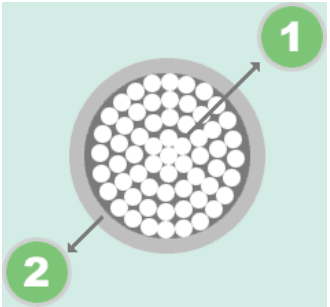
Product Certification Requirements

New Application

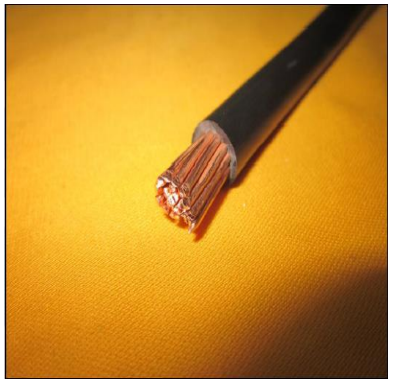
Product Evaluation

Critical Components and Raw Materials

Basic cable components



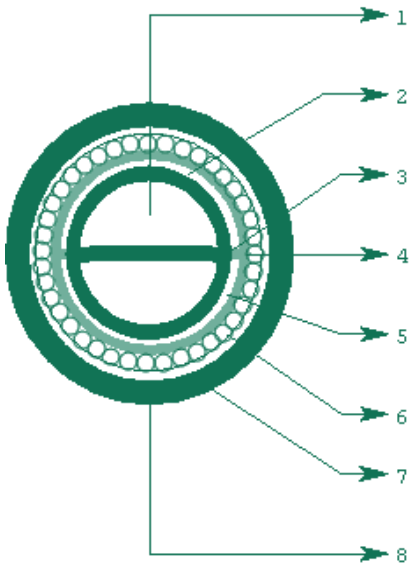
No.	Description	Material
1	Conductor	Annealed Copper
2	Insulation	Polyvinyl Chloride



Sample Selection & Testing (if applicable)

Product Evaluation

Critical Components and Raw Materials



No.	Description	Material
1	Conductor	Plain Annealed Copper
2	Insulation	Polyvinyl Chloride/Cross-linked Polyethylene
3	Filler	Polypropylene Yarn
4	Separator	Polypropylene Woven Tape
5	Inner Sheath	Black Polyvinyl Chloride
6	Armouring	Single Layer Galvanized Steel Round Wire
7	Wrapping	Binder Tape
8	Outer Sheath	Black PVC (ST2)

Product Certification Process

New Application

Factory Audit

In-coming Inspection

All major raw materials /components that have direct influence on product properties / safety shall be subjected to in-coming inspection prior to acceptance and/or production. Manufacturer shall identify inspection / testing to be carried out on each raw material / component and compare the result to the material's / components specification / test reports for acceptance.

In-process Inspection

Manufacturer shall have sufficient control on the intermediate process to ensure that the intended quality of product is achieved. The manufacturer shall identify test to be carried out at various in-process stages and compare the result to the control specifications.

Final Inspection

Manufacturer shall carry out all tests specified under routine tests. These tests are normally carried out on the finished product after assembly but the manufacturer may perform the tests at any appropriate stage during the production, provided that subsequent manufacturing processes do not affect the results.

Following tests are minimum tests to be conducted to cover the safety aspect of the product. The frequency of testing is 100%. It is the manufacturer's responsibility to decide if additional routine tests are necessary.

a) Spark Test (as per BS 5099)

New Application

Routine test

The following are minimum tests that shall be conducted to cover safety aspect of the product. Testing conducted and witnessed during surveillance.

Test	Test method	Result
Functional (100% at production)	Spark tester	No breakdown
Sampling for QA testing at lab (sampling)	i) Conductor resistance test ii) High voltage test (Immersed in water) iii) Constructional and dimensional check	As per standard requirement

Product Certification Process

New Application

Preparation of Certification Report

Certification Report

Product Certification Scheme

This Certification Report shall not be amended, changed, varied or modified in any manner whatsoever by the licensee or otherwise. If the Certification Report is to be furnished to any third party or to the public, each such Certification Report shall be furnished in full and its entirety. This Certification Report shall be read in conjunction with the Product Certification Agreement.

File No	:	PS-009377
Report No	:	RPT009295
Edition	:	
Issued By	:	
Date Issued	:	
Applicant	:	
Factory	:	PLOT 6, JALAN JELAWAT SATU KAWASAN PERUSAHAAN SEBERANG JAYA 13700, PRAI PULAU PINANG, MALAYSIA
Product	:	PVC-INSULATED CABLES (SHEATHED) FOR FIXED WIRING
Certification Basis	:	Standard (s) : • MS 2112-4 : 2009 ELECTRIC CABLE AND WIRE - POLYVINYL CHLORIDE (PVC) INSULATED CABLES OF RATED VOLTAGES UP TO AND INCLUDING 450/750 V - PART 4: SHEATHED CABLES FOR FIXED WIRING Product Certification Requirements in accordance to the Product Certification Agreement Work Instruction : NIL

Verified By :	Approved By :
MUHAMAD KAMAL SABRAN	BASORI BIN HJ SELAMAT
06/08/2015	14/08/2015

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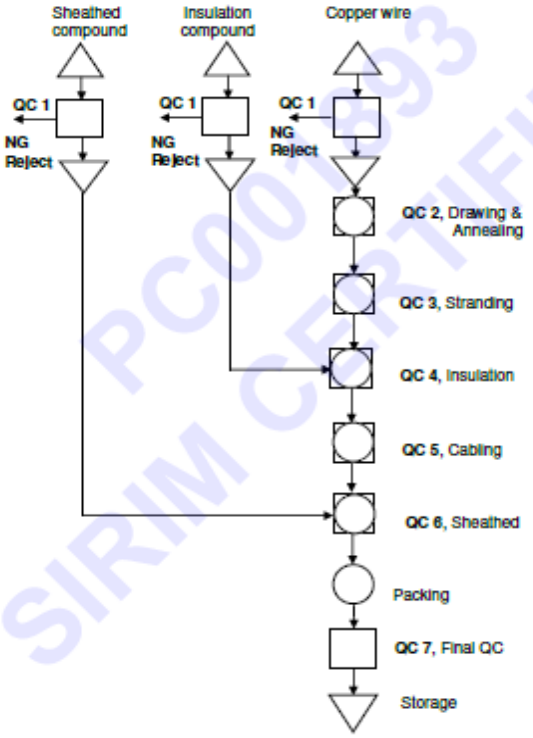
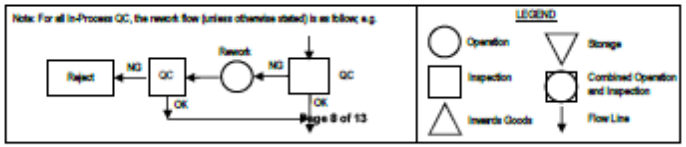
Report No : RPT009295
Date Issued : 18/08/2016
Issued By : NORIZA BINTI MOHAMED SUFIAN

Part G : Quality System Evaluation

1. Test and Inspection Plan

a) Process flow chart





Product Certification Process

New Application

Example of Product description:

Product name:

PVC-Insulated Cables (Sheathed) for Fixed Wiring.

Brand:

As declared by applicant in ePCS/FOR/01-4. If the brand does not belong to the applicant, authorization letter from the owner of the brand has to be obtained.

Model:

As declared by applicant in ePCS/FOR/01-1 and ePCS/FOR/01-2.

Type:

e.g : MS VV 10

Rating:

Voltage : 300/500 V

Size:

e.g : (1.0, 1.5, 2.5, 4, 6, 10, 16, 25, 35) mm2

Marking and Labelling:

MS mark and label for regulated sizes (1.0, 1.5, 2.5, 4, 6, 10, 16, 25, 35) mm2

Product Certification Process

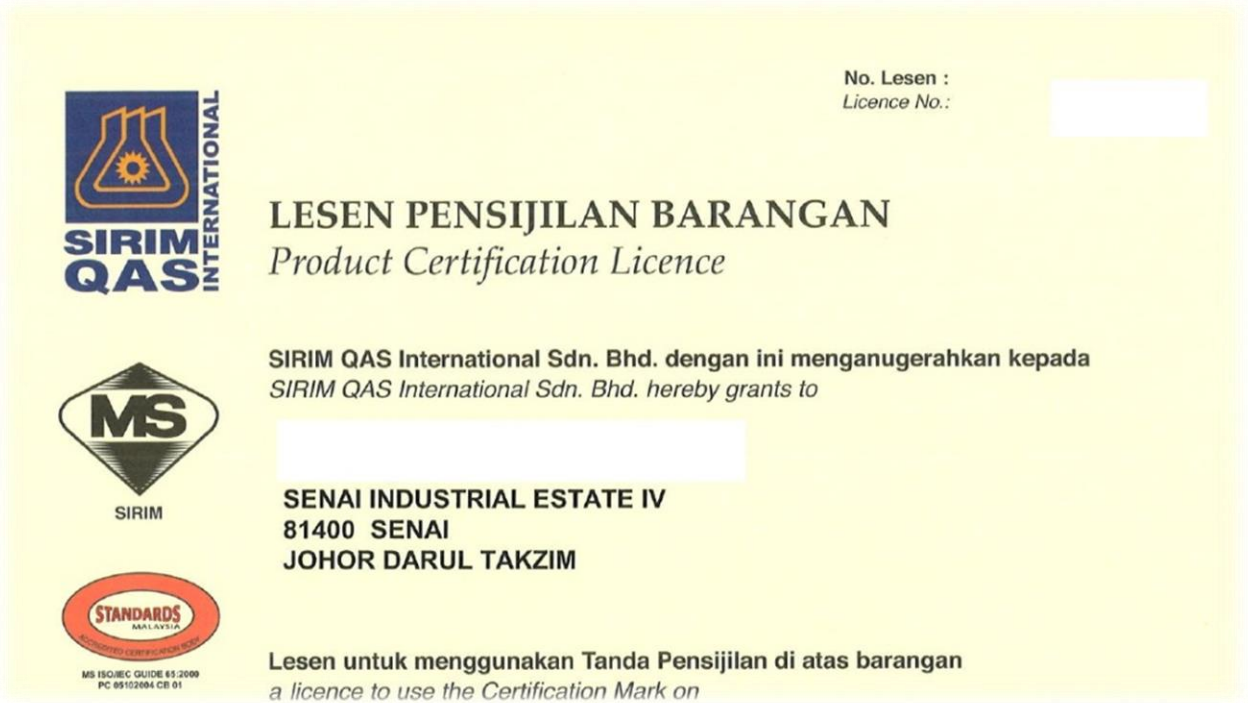
New Application

Certification Panel Approval

Product Certification Process

New Application

Approval and Award of Licence



No. Lesen :
Licence No.:

SIRIM QAS INTERNATIONAL

LESEN PENSIJILAN BARANGAN
Product Certification Licence

MS
SIRIM

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SIRIM QAS International Sdn. Bhd. hereby grants to

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81400 SENAI
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STANDARDS MALAYSIA
MS ISO/IEC GUIDE 65:2000
PC 05102004 CB 01

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a licence to use the Certification Mark on

MS

SIRIM ST
CERTIFIED TO YY : XXXX
CERTIFICATION NO:xxxxxxxx

Product Certification Process

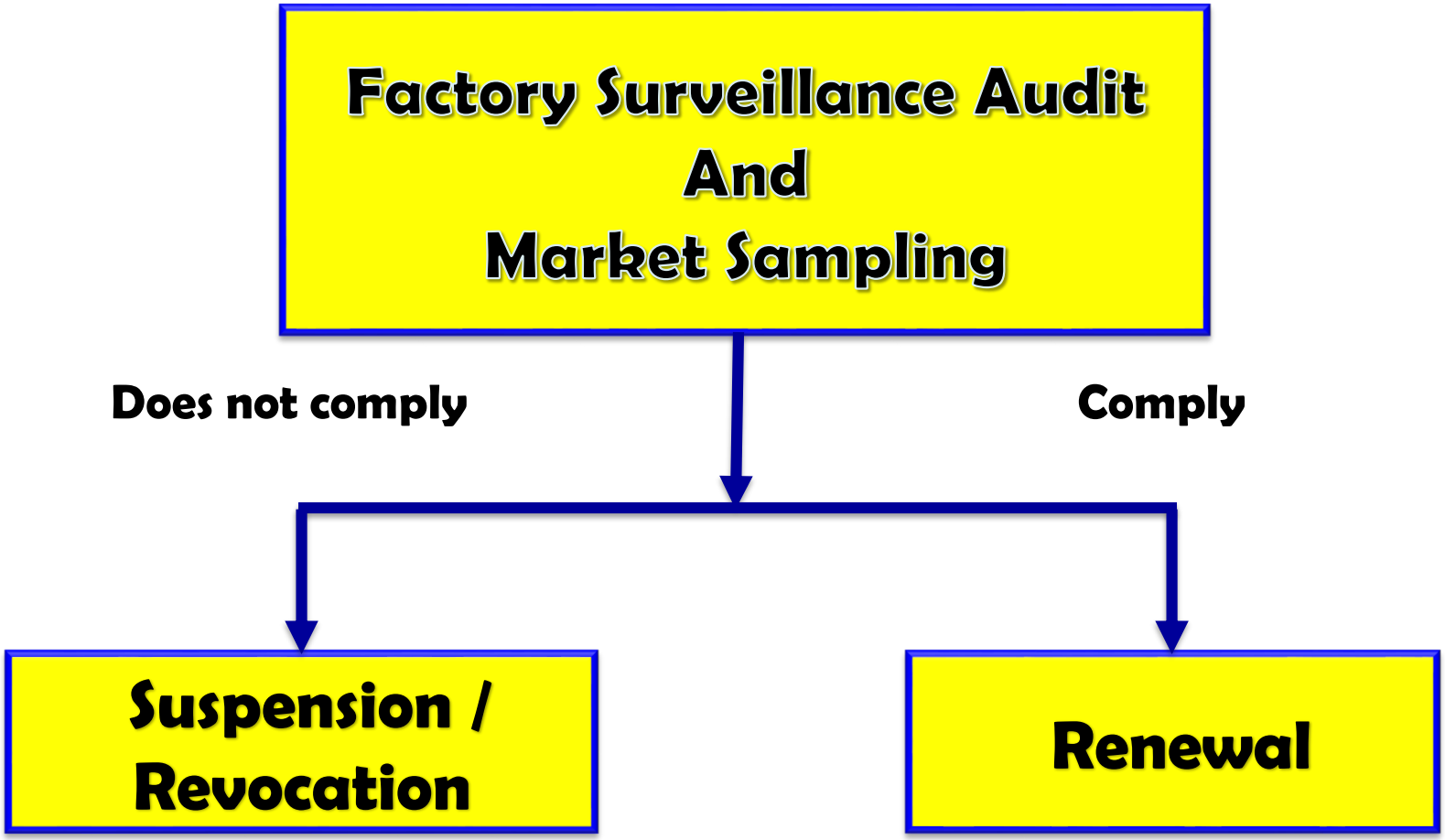
Certification Maintenance

Yearly surveillance audit and licence renewal

Product Certification Agreement
Product Certification Requirements
Certification Report
Regulatory Approval

Product Certification Process

Surveillance and Renewal



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THANK YOU FOR YOUR KIND ATTENTION

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