



21-22 July 2011

Kuala Lumpur Convention Centre (KLCC), Malaysia

Selection of Electric Cables - Risk of Sub-Standard Cables

Presented By
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MALAYSIAN CABLE MANUFACTURERS ASSOCIATION

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Organized by:



**MCMA**
MALAYSIAN CABLE MANUFACTURERS ASSOCIATION

The Malaysian Cable Manufacturers Association or MCMA (formerly known as the Malaysian Electrical Cable & Wire Assoc. or MECWA), was established in 1980 comprising manufacturers of power and telecommunication cables with the following objectives:

- To provide a platform of communication and enhance the cooperation of all members on matters of common interest to the industry
- To promote the products & services and activities of members locally and abroad via a common website and by participation in seminars, exhibition and conferences
- To represent and safeguard the interest of members through channels of discussion and liaison with customers, government agencies and other organisations
- To actively participate and contribute to the development of MS Standards on Electric Cables and related products
- To enhance the reputation of MCMA as an ethical and responsible association of members with a positive contribution to the community

www.mcma.org.my

Malaysian Standards (MS) on Cables



21-22 July 2011, KLCC

NO	PUBLICATION	DESCRIPTION/TITLE	REMARKS
1	MS 2108: 2007	Electric Cable : 6.35/11(12)kV single core XLPE insulated cables – non-armoured	MV-XLPE
2	MS 2109: 2007	Electric Cable : 6.35/11(12)kV single core XLPE insulated cables – armoured	
3	MS 2110: 2007	Electric Cable : 19/33(36)kV single core XLPE insulated cables – non-armoured	
4	MS 2111: 2007	Electric Cable : 19/33(36)kV single core XLPE insulated cables –armoured	
5	MS 2113*	Electric Cable : 12.7/22(24)kV single core XLPE insulated cables – non-armoured	
6	MS 2114*	Electric Cable : 12.7/22(24)kV single core XLPE insulated cables – armoured	
7	MS 2115*	Electric Cable : 6.35/11(12)kV three core XLPE insulated cables – non-armoured	
8	MS 2116*	Electric Cable : 6.35/11(12)kV three core XLPE insulated cables –armoured	
9	MS 2117*	Electric Cable : 12.7/22(24)kV three core XLPE insulated cables –armoured	
10	MS 2118*	Electric Cable : 2.7/22(24)kV three core XLPE insulated cables –armoured	
11	MS 2119*	Electric Cable : 19/33(36)kV three core XLPE insulated cables –armoured	
12	MS 2120*	Electric Cable : 19/33(36)kV three core XLPE insulated cables –armoured	LV-XLPE
13	MS 2104:2007	Electric Cable and Wire: 600/1000(Um = 1200) V single core XLPE insulated cable – non-armoured	
14	MS 2105:2007	Electric Cable and Wire: 600/1000(Um = 1200) V single core XLPE insulated cable –armoured	
15	MS 2106:2007	Electric Cable and Wire: 600/1000(Um = 1200) V multi core XLPE insulated cable –non-armoured	LV-PVC
16	MS 2107: 2007	Electric Cable and Wire: 600/1000(Um = 1200) V multi core XLPE insulated cable –armoured	
17	MS 2100:2006	Electric Cable and Wire: 600/1000(Um = 1200) V single core PVC insulated cable – non-armoured	
18	MS 2101:2006	Electric Cable and Wire: 600/1000(Um = 1200) V single core PVC insulated cable –armoured	450/750V-PVC
19	MS 2102:2007	Electric Cable and Wire: 600/1000(Um = 1200) V multi core PVC insulated cable –non-armoured	
20	MS 2103: 2007	Electric Cable and Wire: 600/1000(Um = 1200) V multi core PVC insulated cable –armoured	
21	MS 2112-1: 2009	Electric Cable and Wire: Polyvinyl Chloride(PVC) insulated cables of rated voltages up to and including 450/750 V – Part 1 : General requirements	Telecoms (draft)
22	MS 2112-2: 2009	Electric Cable and Wire: Polyvinyl Chloride(PVC) insulated cables of rated voltages up to and including 450/750 V – Part 2 : Test Methods	
23	MS 2112-3: 2009 **	Electric Cable and Wire: Polyvinyl Chloride(PVC) insulated cables of rated voltages up to and including 450/750 V – Part 3 : Non-sheathed cables for	
24	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	
25	MS 2112-5: 2009 **	Electric Cable and Wire: Polyvinyl Chloride(PVC) insulated cables of rated voltages up to and including 450/750 V – Part 5 : Flexible cables	
26	MS 2112-6: 2009 **	Electric Cable and Wire: Polyvinyl Chloride(PVC) insulated cables of rated voltages up to and including 450/750 V – Part 6 : Cables for Lifts and flexible	
27	MS 2121*	Telecommunication Cable : Plastic Twin pair, triple and unit types, internal cable	Telecoms (draft)
28	MS 2122*	Telecommunication Cable : Jumper cable	
29	MS 2123*	Telecommunication Cable : Self supporting drop wire	
30	MS 2124*	Telecommunication Cable :Fully Filled Unit Twin moisture barrier polyethylene sheathed cable (FF PEUT)	
31	MS 2125*	Telecommunication Cable :Integral Barrier Unit Twin moisture barrier polyethylene sheathed cable (IB PEUT)	
32	MS 2126*	Telecommunication Cable :Polyethylene Insulated 25 Pair Unit Twin moisture barrier polyethylene sheathed cable (FS PEUT)	

Overview of Standards & Quality of Cables



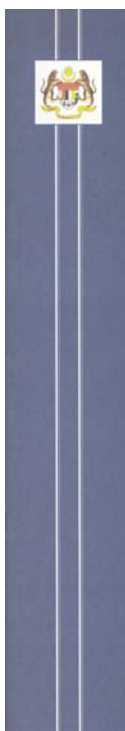
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Um (max voltage)	Class	Ref Stds & Specifications		Risk	Control on Quality & Inspection
		Existing/Prev	New		
Above 170kV	EHV	Utility	Utility	Nil	High scrutiny at all levels
37kV - 170kV	HV	IEC/Utility	IEC/Utility	VLow	High sampling rate of test & inspection
3.7kV - 36kV	MV	BS/IEC/Utility	IEC/MS	Low	Adequate control on test & inspection
1.2kV - 3.6kV	LV	BS/IEC/Owner	IEC/MS	Low	Adequate control on test & inspection
Below 1.2kV	ELV	BS/MS	MS	High	Minimum or no control

Controlled Items by Suruhanjaya Tenaga



CATEGORY	ITEM DETAILS	REF STDS (Prev)	NEW MS
Category 31 - WIRES / CABLES / CORDS 0.5 to 35 sqmm	Insulated flexible cords and cables	MS 140 : 1987	Electric Cable and Wire - Polyvinyl Chloride (PVC) Insulated
	PVC insulated cable (non-armoured) for electric power supply Polyvinyl chloride (PC) insulated flexible cords	MS 136 : 1987 MS 140 : 1987 Equiv stds : BS/IEC/AS DIN/JIS/UL	Cables of rated voltages up to and including 450 / 750 V MS2112-1:2009 Part 1 : General Requirements MS2112-2:2009 Part 2 : Test Methods MS2112-3:2009 Part 3 : Non-Sheathed Cables for Fixed Wiring MS2112-4:2009 Part 4 : Sheathed Cables for Fixed Wiring MS2112-5:2009 Part 5 : Flexible Cables MS2112-6:2009 Part 6 : Cables for Lift and Flexible Connections
	Rubber insulated cord and flexible cables	MS 140 : 1987	Under review, to retain under MS 140 : 1987



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Table 1 Requirements

Table 2 Requirements

Table 3 Requirements

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MS 2112-1:2

MS IEC 60811-1, cables - Part 3 temperature - T_g

MS IEC 60811-1, and optical cable test - Thermal st

IEC 60304, Colo

IEC 60227-2, Pc V - Part 2, Test n

IEC 60227-3, Pc V - Part 3, Non-s

IEC 60227-4, Pc V - Part 4, Shea

IEC 60227-5, Pc V - Part 5, Flexib

IEC 60228, Conc

IEC 60332-1-2, 1 for vertical flame mixed flame

3 Definition:
For the purposes

4 General re

4.1 Conducto
The conductors s

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conductors shall i

The classes of i

particular specific

4.2 Insulation
The insulation at

the cable in the part

6):

a) type PVC/C-7

2

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MS 2112-1:2009

b) The minimum thickness at any place shall not fall below 85 % of the specified value by not more than 0.1mm. Compliance shall be checked by the test given in 4.7 of MS 2112-2. The sheath shall have adequate mechanical strength and elasticity within the temperature limits to which it may be exposed in normal use, with compliance with tests specified in Table 2.

c)

d)

The

5 Marking

5.1 Indication of origin and cable identification
Cables shall be marked with the following details:

a) name of manufacturer;

b) voltage designation;

c) number and size of conductor; and

d) standard number.

The

limit:

1. Cables for use at a conductor temperature exceeding 70 °C shall be marked with the maximum conductor temperature. Marking may be by printing or by embossing on the insulation or sheath.

4.3

5.2 Continuity of marks
The distance between the end and start of each element shall not exceed 50 mm while the distance between the end and start of each complete set of elements shall not exceed 590 mm.

5.3 Durability
Printed markings shall be durable. Compliance with this requirement shall be checked by the test given in 4.5 of MS 2112-2.

5.4 Legibility
All markings shall be legible.

6 Core identification
Each core shall be identified as follows:

a) in cables having up to and including five cores by colour, see 6.1, or

b) in cables having more than five cores by number, see 6.2.

6.1 Core identification by colours
Identification of the cores shall be the use of coloured insulation. Each core shall have one colour, except the core identified by a combination of the colours Green-and-Yellow.

The:

shea

thick

table

4

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MS 211:

MS 2112-1:2009

For cable manner a:

8 Test

8.1 Ele

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8.5 Test

See 6.2 of

The force s

8.6 Flam

All the cabl

Table 2 – Class 2 s

Nominal cross-sectional area	Minimum number		
	Circular		
	Cu	Al	
mm ²			
0,5	7	-	
0,75	7	-	
1,0	7	-	
1,5	7	-	
2,5	7	-	
4	7	-	
6	7	-	
10	7	7	
16	7	7	
25	7	7	
35	7	7	
60	10	10	
70	19	19	
95	19	19	
120	37	37	
150	37	37	
185	37	37	
240	37	37	
300	61	61	
400	61	61	
500	61	61	
630	91	91	
800	91	91	
1 000	91	91	
1 200			
1 400 *			
1 600			
1 800 *			
2 000			
2 500			

* These sizes are non-preferred are not within the scope of this standard.
 b The minimum number of wires of equal segments (Milliken).
 c For stranded aluminium aluminium conductor the resistance value

Ref. no.	Ref. no.
1	1
1.1	2
1.1.1	2.1
1.1.1.1	2.2
1.2	2.3
1.2.1	2.4
1.2.1.1	3
1.2.1.1.1	3.1
1.2.1.1.1.1	3.2
2	3.3
2.1	3.4
2.2	4
3	4.1
3.1	4.2
3.2	
4	

Annex A (informative)

Code designation

Cables of the types covered by this standards are designated by two numerals, cable type and MS (Malaysian standard).

The classes and type of cable are as follows:

1. Non-sheathed cables for fixed wiring

- a) MS IV 01 - Single-core non-sheathed cable with rigid conductor for general purpose;
- b) MS IV 01 - Single-core non-sheathed cable with flexible conductor for general purpose;
- c) MS IV 03 - Single-core non-sheathed cable with solid conductor for internal wiring for a conductor temperature of 70 °C;
- d) MS IV 04 - Single-core non-sheathed cable with flexible conductor for internal wiring for a conductor temperature of 70 °C;
- e) MS IV 05 - Single-core non-sheathed cable with solid conductor for internal wiring for a conductor temperature of 90 °C;
- f) MS IV 06 - Single-core non-sheathed cable with flexible conductor for internal wiring for a conductor temperature of 90 °C;
- g) MS IV 07 - Single-core non-sheathed cable with solid conductor for internal wiring for a conductor temperature of 105 °C; and
- h) MS IV 08 - Single-core non-sheathed cable with flexible conductor for internal wiring for a conductor temperature of 105 °C.

2. Sheathed cables for fixed wiring

- a) MS VV 10 - PVC Insulated PVC sheathed cables.

3. Flexible cables

- a) MS VVF 20 - light PVC sheathed flexible cable;
- b) MS VVF 21 - ordinary PVC sheathed flexible cable;
- c) MS VVF 22 - heat resistant light PVC sheathed flexible cable - 90 °C;
- d) MS VVF 23 - heat resistant ordinary PVC sheathed flexible cable - 90 °C;
- e) MS VVF 24 - heat resistant light PVC sheathed flexible cable - 105 °C; and
- f) MS VVF 25 - heat resistant ordinary PVC sheathed flexible cable - 105 °C.

SUB-STANDARD CABLES

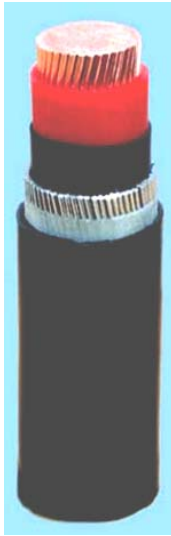


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Cables which are not designed, constructed, test approved, installed or used in accordance to their prescribed standards and/or specifications

The development of national standards for electric cables takes into account the principles and norms as established internationally, current prevailing conditions and local practices. It is important to understand that these aspects are majorly unbeknown to buyers and users, hence failure to comply on critical aspects may present an undetermined risk on safety.

Basic Elements of Electric Cables



- CONDUCTOR
determines base current ratings
- INSULATION
determines voltage / stress levels
- PROTECTIVE LAYER
determines protection level & installation conditions

Sub-Standard Element : Conductors

CRITERIA

- Metal content not meeting specifications (copper >99.9%, alum >99.7%)
- Undersized – conductor does not meet the minimum cross-sectional area as determined by its specific resistance
- Construction not in accordance to prescribed standards on size & number of wires, buildup or dimensions

IMPACT

- Non-compliance to any of the above will result in conductor overload in excess of the maximum current loading of the cable
- This condition would lead to eventual breakdown of cable insulation, joints or connectors at installed positions or distribution boards
- Excessive overheating may result in short circuit conditions leading to an electrical fire

Sub-Standard Element : Insulation

CRITERIA

- Insulation material or type does not meet the required chemical and thermo-mechanical properties for long term ageing and environmental tests
- Applied insulation does not meet the requirement on thickness and physical aspects of the standards stipulated for the type and rated voltage of cable
- Insulated conductors are not identified by markings or colours as stipulated by the standards

IMPACT

- The use of non-compliant insulation material or construction will result in premature deterioration of the cable insulation in service
- This condition may eventually lead to breakdown of cable insulation, joints or connectors at installed positions or distribution boards
- Condition of undetected exposure caused by deteriorated insulation will be hazardous to users

Sub-Standard Element : Protective Layers

CRITERIA

- Material for protective layers do not meet the required chemical and/or thermo-mechanical properties for long term ageing and environmental tests
- Applied protective layers do not meet the requirement on thickness and physical aspects of the standards stipulated for the type and rated voltage of cable
- Completed cables are not identified by markings as stipulated by the standards

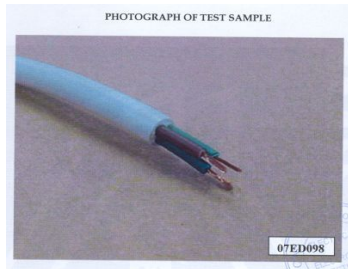
IMPACT

- Cables will not perform or its service life will be greatly reduced if the above properties do not meet their intended installed conditions
- Fire rated or alarm cables may be rendered inactive in fire related situations
- Cables which are incorrectly identified or installed in unintended locations may be hazardous to the environment or users

Anatomy of Sub-Standard Cables



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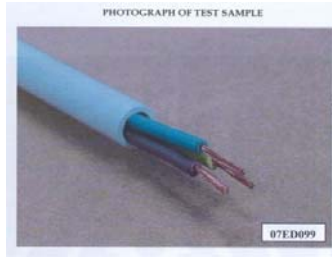
NOTES:

- This is a partial test report.
- All the tests were conducted at SIRIM QAS International Sdn. Bhd. and had been checked in accordance with the following clauses:
 - a) Clause 5.1, 6.2, 7.2, 7.3, 7.4, 19.3 and 22.3 of MS 140: 1987
 - b) Clause 7.1, 7.2, 7.3 and 7.4 of MS 69: 1995
 - c) Tensile & elongation (before ageing) and resistance to crack of MS 138: 1995
- The test sample as described in this test report deemed to comply with the requirements of those test conducted except clause 7.2 and 7.4 of MS 69: 1995 and tensile & elongation (before ageing) of MS 138: 1995.

ADDITIONAL INFORMATION:

1. Tested by: Effahakal Mahmudi, Signature: Date: 3/11/08
2. Checked by: Mr. Sarjan Rasol, Signature: Date: 3/11/08
3. Date of test sample(s) received:
 - a) 1st submission: 11 October 2007
 - b) 2nd submission: -
 - c) 3rd submission: -

Prepared by:



REPORT NO.: 2007ED122 PAGE: 2 OF 8

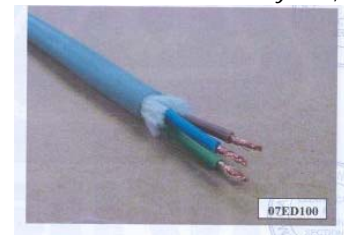
NOTES:

- This is a partial test report.
- All the tests were conducted at SIRIM QAS International Sdn. Bhd. and had been checked in accordance with the following clauses:
 - a) Clause 5.1, 6.2, 7.2, 7.3, 7.4, 19.3 and 22.3 of MS 140: 1987
 - b) Clause 7.1, 7.2, 7.3 and 7.4 of MS 69: 1995
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- The test sample as described in this test report deemed to comply with the requirements of those test conducted except clause 7.2 and 7.4 of MS 69: 1995 and tensile & elongation (before ageing) of MS 138: 1995.

ADDITIONAL INFORMATION:

1. Tested by: Effahakal Mahmudi, Signature: Date: 3/11/08
2. Checked by: Mr. Sarjan Rasol, Signature: Date: 3/11/08
3. Date of test sample(s) received:
 - a) 1st submission: 11 October 2007
 - b) 2nd submission: -
 - c) 3rd submission: -

Prepared by:



REPORT NO.: 2007ED123 PAGE: 2 OF 7

NOTES:

- This is a partial test report.
- All the tests were conducted at SIRIM QAS International Sdn. Bhd. and had been checked in accordance with the following clauses:
 - a) Clause 5.1, 6.2, 7.2, 7.3, 7.4, 19.3 and 22.3 of MS 140: 1987
 - b) Clause 7.1, 7.2, 7.3 and 7.4 of MS 69: 1995
 - c) Tensile & elongation (before ageing) and resistance to crack of MS 138: 1995
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 - a) 1st submission: 11 October 2007
 - b) 2nd submission: -
 - c) 3rd submission: -

Prepared by:

Sub-Standard Cables – A Lucrative Business?



21-22 July 2011, KLCC

Item	Flexible Cable 40/0.16mm (0.75sqmm) x 3C 300/500V PVC/PVC				
	STD	07ED100	07ED099	07ED098	
Conductor					
- number of wires	40	39	38	38	
- resistance	ohm/km	26	29.8	69.3	
- equiv area	sqmm	0.731	0.638	0.274	
- cond diam	mm	1.061	0.991	0.650	
- total weight	gm/m	19.490	17.004	7.312	
Insulation					
- nominal thickness	mm	0.56	0.65	0.75	
- weight per core	gm/m	4.278	5.027	4.948	
- total weight	gm/m	12.834	15.080	14.843	
- core diam	mm	2.181	2.291	2.150	
- laidup diam	mm	4.711	4.949	4.644	
Sheath					
- overall diam	mm	6.4	7.07	6.89	
- nominal thickness	mm	0.84	1.06	1.12	
- calc mass	litre	14.739	20.023	20.347	
- total weight	gm/m	21.371	29.034	29.504	
Cable overall weight	gm/m	53.7	61.1	51.7	
Reference		STD	07ED100	07ED099	07ED098
Cu price	M yr/kg	30	30	30	30
PVC price	M yr/kg	4.5	4.5	4.5	4.5
Cu	M yr/m	0.585	0.510	0.219	0.136
PVC	M yr/m	0.154	0.199	0.200	0.227
Material cost	M yr/m	0.739	0.709	0.419	0.363
ROI	Case 1	10 %	15 %	94 %	124 %
ROI	Case 2	5 %	9 %	85 %	114 %
ROI	Case 3	0 %	4 %	76 %	104 %

Danger in using inferior wires, says association

Items flooding the market of late do not conform to safety standards

KUALA LUMPUR, Wed: Thinking of rewiring your home, or office? Before you spend your money, take note that there has been an influx of substandard wires and cables flooding the market of late.

The Malaysian Electric Cable & Wires Association (Mecwa), the association representing Malaysia's wire and cable manufacturers, said today it will undertake a nationwide campaign to stamp out substandard cables and wires.

Mecwa president Datuk Kenneth H'ng said its members were aware of the increasing number of such home wires and cables in the market which do not conform to the quality and standards approved and recognised by the quality certification bodies.

"In addition, these cables are often packaged in short lengths duping the consumers into

thinking that he or she is buying 100m but is, in fact, receiving less," he said in a statement.

H'ng said the low quality cables are a danger to the public, and the association is determined to approach the government and the standards authorities to get the products off the shelves.

"Substandard cables are a safety hazard. Consumers are being cheated when they purchase poor quality, falsely labelled product."

He said the association will recommend to the government that all wire and cable manufacturers attain the ISO 9001/9002 quality standard accreditation and that the authorities approve renewals based on successful quality accreditation.

He said the association will meet with relevant authorities, including Sirim, on the matter. — Bernama

Killer sockets, deadly fuses

Fake Sirim stickers on electrical items sold to developers

ELECTRICAL components such as switches, plugs, sockets, fuses and cables are being sold in the market with fake Sirim certification stickers — and some are being sold to contractors and developers of high housing projects, reported Human Resources.

The paper said these products were manufactured illegally at a workshop in the Klang area.

Calling these "killer sockets" and "deadly fuses", the newspaper disclosed that such products were the main cause of short circuits, "exploding" electrical products and fires at houses and shops.

Sirim and the Domestic Trade and Consumer Affairs Ministry made this shocking discovery in Kluang on Thursday.

One of the whistleblowers found being the electrical items was a 100-watt light bulb. The newspaper reported that the components were approved and safe.

The newspaper reported that one of the shop owners also admitted to the authorities that he had purchased the components at the back of his shop to save costs.

What was even more shocking, the report said, was that investigations showed that these unsafe electrical components were being sold to contractors and house developers.

Under the law, the owner of the premises found to have sold the Sirim tags can be fined up to RM250,000.



Association: Low quality wires flooding market

KUALA LUMPUR: The Malaysian Electric Cable and Wires Association has warned the public to be wary of sub-standard wires and cables flooding the market.

Association president Datuk Kenneth H'ng, in making this revelation yesterday, said it would carry out a nationwide campaign to stamp out these sub-standard house wiring cables which had begun appearing in the market.

He said association members were aware of the rising quantity of such cables in the market which did not conform to the standards of certification bodies.

"In addition, these undersized and sub-standard cables are often packaged in short lengths so that consumers may think they're buy-

ing 100m but are, in fact, getting less," he said in a statement.

H'ng said the low-quality cables were dangerous to the public and the association was determined to approach the Government and the standards authorities for help.

"Sub-standard cables are safety hazards, and in addition, the consumers are being cheated when they buy poor quality, falsely-labelled products," he said.

He said the association would recommend to the Government that all wire and cable manufacturers attain the ISO 9001/9002 quality standard accreditation.

He also called on the authorities to approve renewals based on successful quality accreditation. — Bernama

1Malaysia vs Sub-Standard Cables – The Way Forward

- ✓ To review & establish MS standards for cables & wires in full compliance with international standards and with due consideration given to meet pertinent local requirements, conditions & practices
- ✓ To publicize and promote the use of MS standards where available on cables and wires for domestic use, local installations and elsewhere by Malaysian contractors
- To combat against the manufacture, importation and use of sub-standard cables in the interest of public safety and towards sustaining an equitable and economically viable business for the cable manufacturing sector
- To support all measures by the relevant authorities including the imposition of clear labeling and the prohibition of retail selling of cables and wires without the MS standard mark of approval for items listed under the control of Suruhanjaya Tenaga (ST)
- ❖ To advocate the registration of all local manufacturers under MCMA as a prerequisite to be a supplier of the ST controlled MS standard cables
- ❖ To continually support and enhance the local economy and the Buy Malaysia campaign via the use of the wide range of manufactured cables, Made in Malaysia

Thank You