

HITACHI

Hitachi Cable (J) Sdn. Bhd.

QUALITY POLICY

As a cable manufacturer, Hitachi Cable (J) Sdn. Bhd. always strives to maintain half a step ahead of our competitors in terms of meeting customer's specification, product quality, cost and service.

We will implement, maintain and continuously improve our Quality Management System to ensure that :

- * Our employees are trained on the importance of quality.
- * Our machines and equipment are maintained and continuously improved.
- * Quality material is used to maximize cost effectiveness.
- * Work method is documented and standardized.

Quality objectives are to be established and reviewed continuously for its suitability.

We will produce suitable products, which meet our customer needs, legislative requirement and deliver them Just-In-Time.

All the above activities will be integrated and managed for the purpose of fostering dynamic business growth through continuous improvement, optimizing profitability and meeting overall customer satisfaction.

The above quality policy are communicated to our employees through the training and awareness program.

Issued on :
01 Apr 2002



HITACHI CABLE (S) PTE. LTD



HITACHI CABLE (J) SDN. BHD.

Hitachi Cable (Johor) Sdn. Bhd.

OVERVIEW

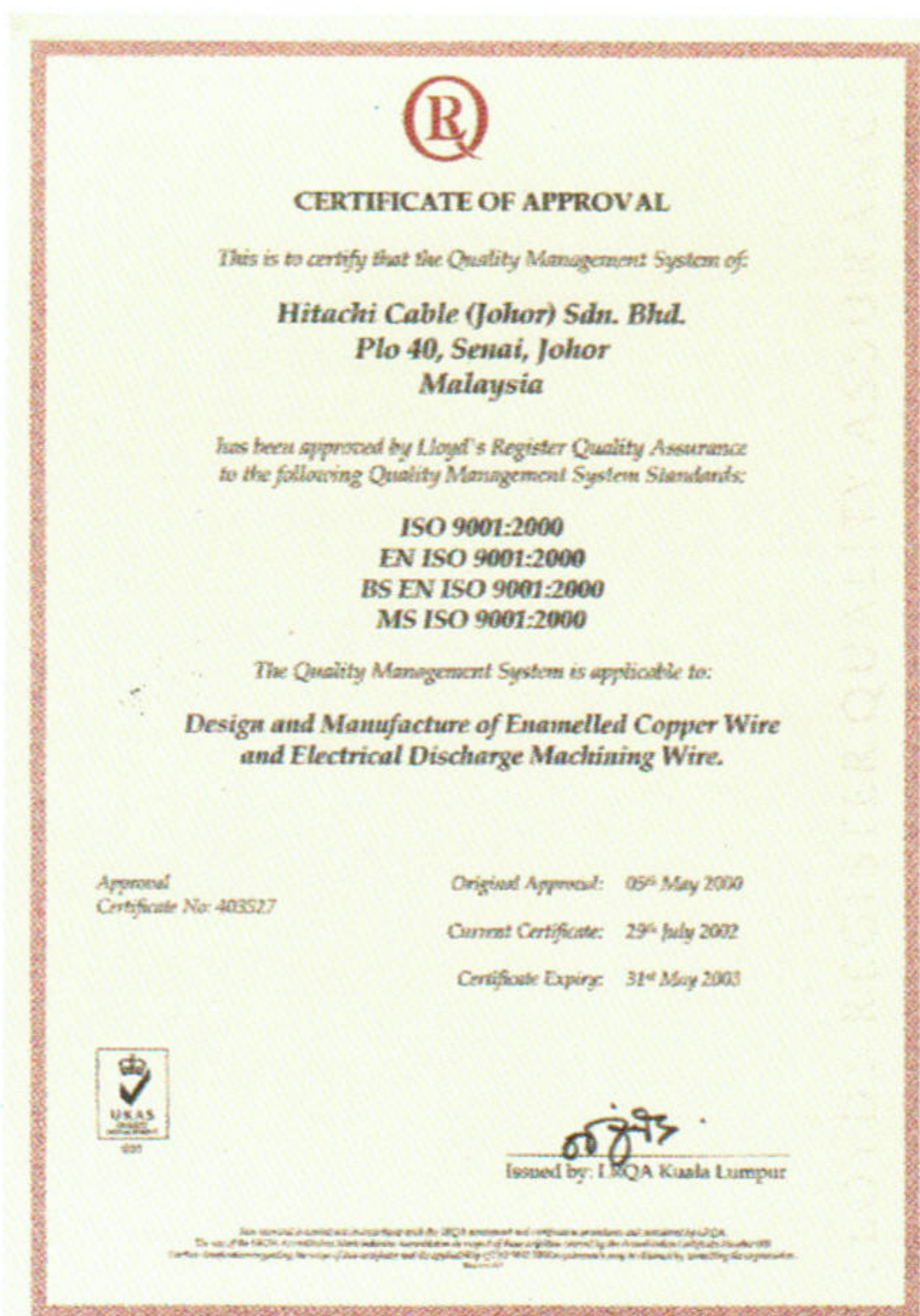
Hitachi Cable (Johor) Sdn. Bhd. is a subsidiary of Hitachi Cable Ltd., a leading Japanese manufacturer of electrical and electronics wire and cable. Located in Senai Industrial Area in Johor, we began production of AC Power Cord in 1990 and since then have progressed to producing Flexible Flat Cable and Enamelled Copper wire.

In order to achieve a global reach, Hitachi Cable (Johor) has placed unwavering commitment to product quality and at the same time, be responsible for the preservation of the global environment.

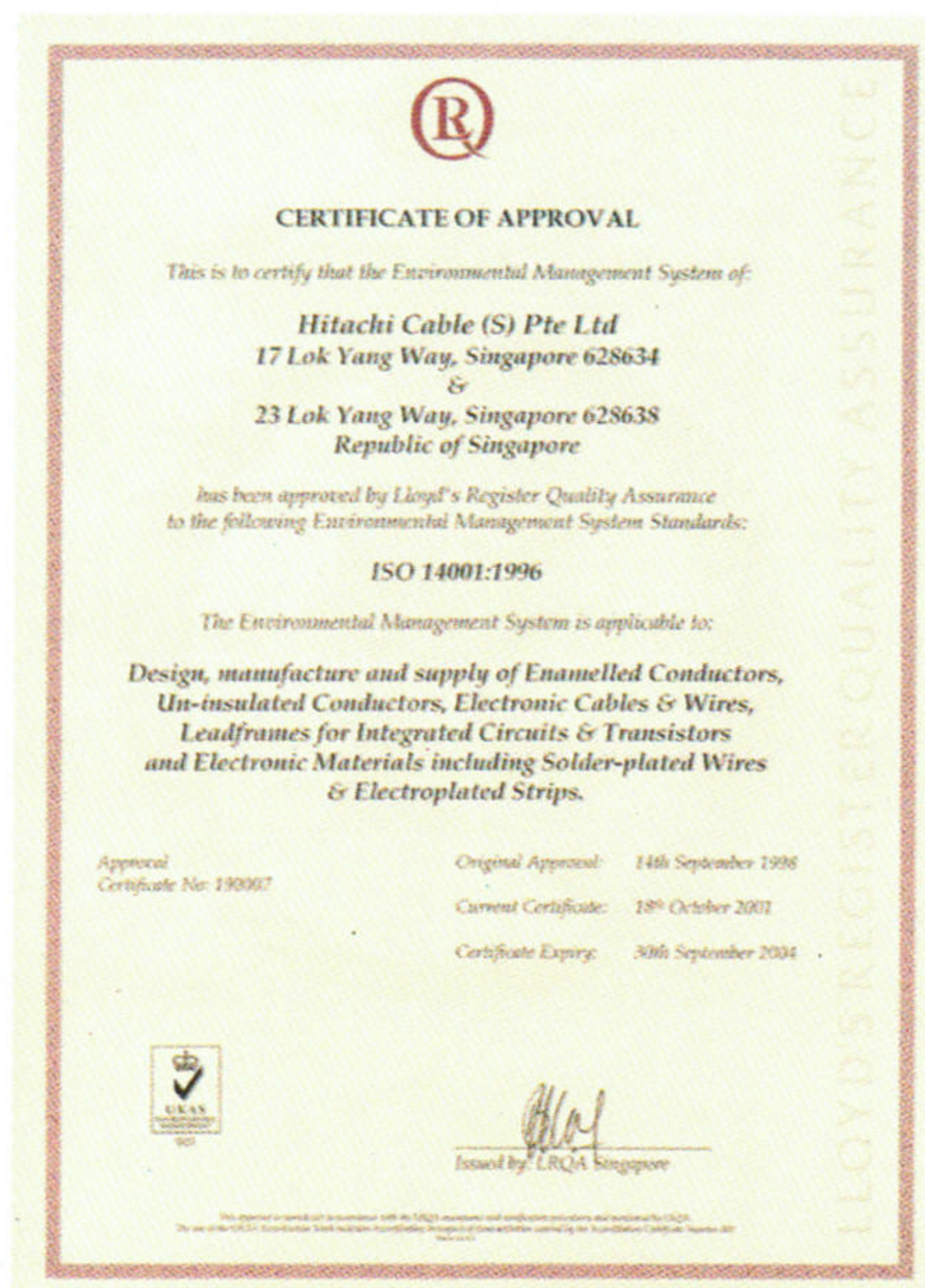
The attainment of the internationally recognized and prestigious ISO 9001 and ISO 14001 certifications are new laurels, marking our relentless drive towards total business excellence.



ISO 14001 (JOHOR) Certificate No: 197007



ISO 9001 (JOHOR) Certificate No: 403527



ISO 14001 (SINGAPORE) Certificate No: 190007



ISO 9001 (SINGAPORE) Certificate No: 160138

UNDERWRITERS LABORATORIES APPROVED

Our wires are certified by underwriters laboratories and satisfy the stringent quality requirements of major international standards such as

- Japanese Industrial Standard (JIS)
- National Electrical Manufacturers Association (NEMA)
- International Electrotechnical Commission (IEC)
- Australia Standard (AS)

We are currently in the process of applying for the recognition of ANSI type MW 30-C and MW 82-C that are expected to complete in the year 2003.

We have also obtained provisional Recognition for material Designation. #HAB #UEW-H ANSI TYPE MW 80-C .

OBMW2

September 30, 2002

(Systems, Electrical Insulation - Component) Magnet Wire - Component

HITACHI CABLE (JOHOR) SDN BHD

E215594

PLO 40 KAWASAN PERINDUSTRIAN SENAI 81400 SENAI,
JOHOR MALAYSIA

Mtl Dsg	Mark Dsg	Coat Type		ANSI Type	Temp Class
		BC	OC		
\$#SBA# EIW-S	—	Polyester-imide	Polyamide	MW76-C	180
\$#SBS# EIW-S	—	Polyester-imide	Polyamide	MW76-C	180
\$#SB# EIW-S	—	Polyester-imide	Polyamide	MW76-C	180
\$#UEW	—	Polyurethane	—	MW75	130
\$#UEW-FT	—	Polyurethane	—	MW75	130
\$#NY UEW	—	Polyurethane	Polyamide	MW28	130
\$#UEW-S, \$#NY UEW-H	—	Polyurethane	Polyamide	MW28	130
				MW80	155
				MW83	180
#AMW-XV	—	Polyester-imide	Polyamide-Imide	MW35	200
#AMW-RE	—	Polyester-imide	Polyamide-Imide	MW73	200
				MW35	

10/18/2002

Underwriters Laboratories Inc.

Card 1 of 3

OBMW2

September 30, 2002

(Systems, Electrical Insulation - Component) Magnet Wire - Component

HITACHI CABLE (JOHOR) SDN BHD

E215594

Mtl Dsg	Mark Dsg	Coat Type		ANSI Type	Temp Class
		BC	OC		
#AMW-XVE	—	Polyester-imide	Polyamide-Imide	MW35	200
EIW-AU	—	Polyester-imide	Polyamide-Imide	MW73	200
				MW35	
#AIW	—	—	Polyamide	—	220
				MW81	200

\$ = may prefix with "LZ" and number of strands.

= may prefix with number indicating class.

Marking: Company name, material designation or marked designation on package or reel, and Recognized Component Mark.

See General Information Preceding These Recognitions

10/18/2002

Underwriters Laboratories Inc.

Card 2 of 3

ENAMELLED WIRE APPLICATION



We manufacture various kinds of enamel-coated copper wires suitable for high-speed and high-tension winding. **Robustness** of these wires means that they can be wound into complex structures without excessively damaging the insulation.

Our **self-bonding** litz wire is pinhole-free. With stringent process control, we are able to minimise the variation in convergence for Color Display Tube Deflection YoKe (CDT-DY).

In addition, we provide **self solderable** wire with high thermal stability. This option will certainly improve the productivity of our customers.

TYPES OF ENAMELLED WIRE AND ITS APPLICATION

CATEGORY	TYPE	CODE	THERMAL CLASSIFICATION (°C)	CHARACTERISTICS	PRECAUTION	APPLICATION
SINGLE COAT	POLYURETHANE	UEW-L UEW UEW-H UEW-HE	E (120) B (UL 130) F (155) H (180)	*Good Solderability *Superior " " characteristics at high frequency *Free to colour	*Crazing with stress (Recovered by curing)	*Meters *Communication Apparatus *Electronic Devices
	POLYESTER	PEW PEW (F)	B (130) F (UL 155)	*High continuous operating temperature *Good solvent resistance	*Difficult to strip off insulation	*Motors for Household *Appliances
	POLYESTER-IMIDE	AMW AMW-S	H (180)	*Good Heat Shock Resistance *High continuous operating temperature	*Poor adherence	*Small size High Power *Motors & Electromagnetic Coils
	POLYAMIDE-IMIDE	AIW	C (220)	*Excellent Abrasion Resistance *Outstanding Thermal Stability *High Resistance to overload & cut through *Excellent Refrigerant Resistance	*Poor flexibility	*Apparatus for high Operating Temperature *Motors for Power Tools
DUAL COAT	NYLON POLYURETHANE	NY UEW NY UEW-H	E (120) B (UL 130) F (UL 155)	*Smooth surface *Good Heat Shock Resistance	*Same as UEW	*Small motors & transformers
	NYLON POLYESTER	NY PEW	B (130) F (UL 155)	*Good Heat Shock Resistance *Smooth surface	*Same as PEW	*Small motors
	SELF-BONDING POLYURETHANE	NY PEW	E (120) B (130)	*Self-Bondable by Heating without varnish treatment	*Same as UEW	*Small motors *Communication Apparatus
	SELF-BONDING POLYESTER	HBH PEW	B (130) F (155)	*Strong Bond between wires	*Same as PEW	*Deflection Yoke Coil
	SELF-BONDING POLYURETHANE	HAB UEW-H	F (UL 155) H (180)	*Self-Bondable by Hot air without varnish treatment		*Spindle Motor & Voice coil Magnet for Hard disk drive
	SELF BONDING POLYAMIDE-IMIDE	SB EIW SB EIW-S	H (180) H (UL180)	*Solderable Polyester-Imide	*Same as AMW	*Magnetic Coils *DY coil application
	SELF-BONDING POLYESTER-IMIDE	BS AIW	220	*High temperature bonding application	*Same as AIW	*Stator coils for motor
	SELF BONDING POLYAMIDE-IMIDE	BN AIW	220	*Alcohol bonding application	*Same as AIW	*Coils for motor
	POLYAMIDE-IMIDE COATED OVER POLYESTER-IMIDE	AMW XV EIW VE	H-C (UL 200)	*Good Resistance to R-22 Refrigerant *Outstanding Thermal Stability		*Motors used in Freon Gas e.g. Air Conditioner *Microwave Oven Transformer
TRIPLE COAT	POLYAMIDE-IMIDE COATED OVER POLYESTER-IMIDE	AMW-XVE EIW-VES	H-C (200)	*Good surface lubricity *Good Resistance to R-22 Refrigerant *Outstanding Thermal Stability		*Motors used in freon gas
LITZ WIRE	ANY COATING ANY NUMBER OF STRAND	LZ	SAME AS COATING BARE LITZ WIRE	*Lower Coils Resistance *Good Flexibility *Reduced Heat Generation *Annealed copper wire		*DY Coil for Super High *Definition TV & Display *Power Supply Transformer *Choke Coil for Switching *Jump wire

PROPERTIES OF ENAMELLED WIRE

PROPERTIES	TESTING CONDITIONS		
Physical Properties	Dimension (mm)	Conductor dia.	
		Film thickness	
	Elongation (%)		
	Flexibility	Winding (overall dia.x1)	
		Winding (conductor dia.x1)	
		Winding after 10% elongation	
		Winding after 20% elongation	
Scrape Resistance	Repeated Scraping (strokes)		
	Unidirectional Scraping (grams)		
Thermal Properties	Thermal Aging	Temperature (°C)	
		Remaining % of BDV after aging	
	Cut Through (°C)		
	Heat Shock	Temperature (°C)	
		Normal condition	
After 10% elongation			
	After 20% elongation		
Electrical Properties	Dialectric Strength	(V)	
		(V / 0.1 mm)	
Chemical Properties	Xylene	<60 0C x 0.5 h>	
	Sulphuric acid (SG 1.2)	<R.T. x 24 h>	
	Caustic soda sol. (10%)	<R.T. x 24 h>	
	Transformer oil	<100 °C x 24 h>	
	Styrene	No treatment R.T. x 24 h	
Refrigerant Proof	No treatment	Pencil hardness	
	R-22	Total appraisal	
		at R.T.	Blister
			Pencil hardness
		at 125 °C	Blister
	Pencil hardness		

WIRE TYPE							NOTES
UEW	NY UEW	PEW	NY PEW	AMW	AIW	AMW XV	
0.997	1.000	1.002	1.000	1.002	1.000	1.000	
0.044	0.040	0.041	0.039	0.043	0.043	0.041	
37.9	38.7	36.9	39.0	38.9	38.78	39	
0/5	0/5	0/5	0/5	0/5	0/5	0/5	denominator : no. of test coil
0/5	0/5	0/5	0/5	0/5	0/5	0/5	numerator : no. of coil showing visible cracks
x1, OK	x1, OK	x1, OK	x1, OK	x1, OK	x1, OK	x1, OK	times of conductor diameter by winding
x1, OK	x1, OK	x1, OK	x1, OK	x1, OK	x1, OK	x1, OK	
34	60	52	60	63	411	162	weight : 600 grams
900	1000	1100	1300	1200	1600	1320	
160	160	200	200	200	200	200	time : 168 hours
80	80	80	80	80	98	95	
250	240	300	280	320	400	390	weight : 800 grams
150	150	150	150	200	200	200	times of conductor diameter by winding time : 1 hour
x4, OK	x3, OK	x3, OK	x2, OK	x1, OK	x1, OK	x1, OK	
x5, NG	x4, OK	x5, OK	x3, OK	x1, OK	x1, OK	x1, OK	
x5, NG	x5, OK	x5, NG	x4, OK	x3, OK	x1, OK	x3, OK	
9990	11400	10970	10800	11500	11600	10900	twist pair method
11350	14250	13380	13850	13310	13490	13300	
○	○	○	○	○	○	○	scrape once with finger nail ○ : good x : no good
○	○	○	○	○	○	○	
○	○	○	○	○	○	○	
○	○	○	○	○	○	○	
5H	-	4H	-	5H	6H	5H	pencil hardness
3H	-	4H	-	4H	6H	5H	
		4H		5H	6H	5H	samples used in refrigerant proof test were class 0 enamelled wire ◎ : very good ○ : good Δ : not recommended x : no good
		Δ		Δ	◎	◎	
		X		X	○	○	
		H		3H	6H	5H	
		X		X	○	○	
		H		3H	6H	5H	