



PROVINCIAL ELECTRICITY AUTHORITY

POWER SYSTEM STANDARD DIVISION

AL, AL-ALLOY, ACSR, ARMOUR TAPE, AND TIE WIRE

Specification No.: RCBL-039/2551

Approved date : 1-09-2008

Rev. No. : 1

Form No. 04-2&3

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Invitation to Bid No. : ๓.3๓๒๒.(๑๕.)e-bidding009/2562

C Material, equipment, and specifications for ALUMINIUM STRANDED CONDUCTOR, ALUMINIUM-ALLOY STRANDED CONDUCTOR, ALUMINIUM CONDUCTOR STEEL REINFORCED, ARMOUR TAPE, AND TIE WIRE

C1 General material and packing instructions

Additional to the general instructions, the following shall be observed :

1a Scope

These specifications cover aluminium stranded conductor, aluminium-alloy stranded conductor, aluminium conductor steel reinforced, armour tape, and tie wire.

1b Standard

Aluminium stranded conductor, aluminium-alloy stranded conductor, aluminium conductor steel reinforced, shall be manufactured and tested in accordance with the latest edition of the following standard :

TIS 85 : Round wire concentric lay overhead electrical stranded conductors

Aluminium used for the armour tape, and tie wire shall be manufactured and tested in accordance with the latest edition of the following standard :

ASTM B 609 : Specifications for aluminium 1350 round wire, annealed and intermediate tempers, for electrical purposes

or equivalent, and all other relevant standard, unless otherwise specified in these specifications.

1c Principal requirement

Aluminium conductor steel reinforced shall be applied a neutral grease on all steel wires.

The conductor sizes and characteristics of aluminium stranded conductor, aluminium-alloy stranded conductor, aluminium conductor steel reinforced shall be according to Table 1, Table 2 and Table 3 respectively.

Armour tape shall be rounded at the edges and soft-drawn.

Tie wire shall be round and soft-drawn.

Test : Besides manufacturer's test certificate, PEA shall test the properties of conductors according to the above-mentioned standard at PEA's testing laboratory before acceptance as well.



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Table 1 Characteristics of Aluminium Stranded Conductor (A1 conductor)

Code Number	Area mm ²	Number Of wires	Diameter		Linear mass kg/km	Rated strength kN	D.C. resistance Ohm/km
			Wire mm	Cond. mm			
35	34.91	7	2.52	7.56	96	5.94	0.8202
50	50.14	7	3.02	9.06	137	8.27	0.5711
95	94.76	19	2.52	12.60	261	16.11	0.3036
120	121.21	19	2.85	14.25	333	20.61	0.2374
185	184.54	37	2.52	17.64	509	31.37	0.1563
240	242.54	61	2.25	20.25	670	43.66	0.1191
400	389.14	61	2.85	25.65	1075	66.15	0.0742

Table 2 Characteristics of Aluminium-alloy Stranded Conductor (A3 conductor)

Code Number	Area mm ²	Number Of wires	Diameter		Linear mass kg/km	Rated strength kN	D.C. resistance Ohm/km
			Wire mm	Cond. mm			
35	34.36	7	2.50	7.5	94	11.17	0.9682
50	49.48	7	3.00	9.0	135	16.08	0.6724
95	93.27	19	2.50	12.5	256	30.31	0.3584

Table 3 Characteristics of Aluminium Conductor Steel Reinforced (A1/S1A conductor)

Code number	Steel ratio %	Area			Number of wire		Wire diam.		Diameter		Linear mass kg/km	Rated strength kN	D.C. resistance Ohm/km
		Alum. mm ²	steel mm ²	Total mm ²	Al	St	Alum. mm	steel mm	Core mm	Cond. mm			
35	17	34.3	5.7	40.0	6	1	2.70	2.70	2.70	8.1	139	12.37	0.8352
50	17	48.3	8.0	56.3	6	1	3.20	3.20	3.20	9.6	195	16.81	0.5946
95	16	94.4	15.3	109.7	26	7	2.15	1.67	5.01	13.6	381	34.93	0.3059
120	16	121.6	19.8	141.4	26	7	2.44	1.90	5.70	15.5	491	44.50	0.2375
185	16	183.8	29.8	213.6	26	7	3.00	2.33	6.99	19.0	741	65.27	0.1571
380	13	382.0	49.5	431.5	54	7	3.00	3.00	9.00	27.0	1443	121.30	0.0757



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1d Packing

1d.1 The conductors shall be packed on non-returnable wooden reels with hub reinforcements. Reels shall be lagged with suitable wooden battens to protect the conductors against damage. After lagging, the galvanized steel wire or steel strap shall be fitted to the battens over each flange of the reel. Overall outside diameter of reel for conductor sizes up to 400 mm^2 shall not exceed 2.0 meters. The wooden parts of reels shall be treated with water-borne wood preservatives, Chromated Copper Arsenate (CCA), according to Group 3 of the latest TIS 515, see Table 4 to a dry net salt retention of 12.0 kg/m^3 .

Table 4
Active Ingredients of CCA

Description	TIS 515 - 2527		
	Group 3		
	Type 1	Type 2	Type 3
Copper, as CuO %	16.0 - 20.9	18.0 - 22.0	17.0 - 21.0
Chromium, as CrO ₃ %	59.4 - 69.3	33.0 - 38.0	44.5 - 50.5
Arsenic, as, As ₂ O ₅ %	14.7 - 19.7	42.0 - 48.0	30.0 - 38.0

The conductor in each reel shall be supplied in production length as mentioned in Table 5, Table 6 and Table 7 with variation of $\pm 5\%$.

For aluminium stranded conductor sizes up to 400 mm^2 , aluminium-alloy stranded conductor sizes up to 95 mm^2 , and aluminium conductor steel reinforced sizes up to $380/50 \text{ mm}^2$ shall be supplied in reels as shown in Page 7 of 7 and in production lengths specified in the Table 5, Table 6, and Table 7 (see Page 6 of 7).

Both terminals of conductor in each reel shall be permanently marked with manufacturer's symbol, for checking the original length.

An amount not exceeding 10% of the total length may be delivered in random lengths, but any such length shall not be less than 50% of the production length on one reel.

On acceptance, the measured length of conductor in each reel shall not be less than the packing length shown on the reel.

1d.2 The armour tape shall be supplied in coil, preferably 10 kg per coil.

The dimensions of coil shall be as follows :

- Inside diameter : 18 cm, approximately
- Height : 10 cm, approximately

1d.3 The tie wire shall be supplied in coil, preferably 25 kg per coil, or in manufacturer's standard weights which shall be round figure.



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C2 Material and packing data to be given by bidder

2a Aluminium stranded conductor and aluminium-alloy stranded conductor details

Nominal cross-sectional area of conductor in mm^2 .

Actual cross-sectional area of conductor in mm^2 .

Number of wires.

Diameter of wire in mm .

Overall diameter of conductor in mm .

Construction of conductor.

Minimum calculated strength in N or kgf .

Maximum resistance at 20°C in ohm/km .

Weight resistivity of aluminium wire at 20°C in ohm-g/m^2 .

Weight of conductor in kg/km .

2b Aluminium conductor steel reinforced details

Nominal cross-sectional area of conductor in mm^2 .

Actual cross-sectional area of conductor in mm^2 .

Number of wires (A1/S1A) .

Diameter of wire (A1/S1A) in mm .

Overall diameter of conductor in mm .

Construction of conductor.

Minimum calculated strength in N or kgf .

Maximum resistance at 20°C in ohm/km .

Weight resistivity of aluminium wire at 20°C in ohm-g/m^2 .

Weight of conductor in kg/km .

2c Armour tape details

Dimension (cross-section) in mm x mm .

Breaking strength in N or kgf .

Weight of armour tape in kg/km .

2d Tie wire details

Diameter (cross-section) in mm .

Cross-sectional area in mm^2 .

Breaking strength in N or kgf .

Weight of tie wire in kg/km .



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2e Packing details

2e.1 Packing details for conductor

Packing method (shown by drawing(s), describe packing materials, details of wood treatment, name and composition of preservatives and details of conductor terminal marking) .

Number of reels .

Principal dimensions of reel in mm .

Gross weight of one reel in kg .

Net weight of one reel in kg .

Length of uncut conductor per reel in m .

2e.2 Packing details for armour tape and tie wire

Packing method.

Dimensions (cross-section) of armour tape in mm x mm .

Diameter (cross-section) of tie wire in mm .

Cross-section area of tie wire in mm² .

Principal dimensions of each coil in mm .

Net weight of each coil in kg .

Length of uncut armour tape or tie wire per coil in m .



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Table 5

Packing Details for Aluminium Stranded Conductor

PEA Material No.	Code number	Nominal cross-sectional area (mm ²)	Reel size (mm)	Production length per reel (m)
1020010001	35	35 (35-A1-7)	1,000	4,500
1020010002	50	50 (50-A1-7)	1,000	3,100
1020010004	95	95 (95-A1-19)	1,400	4,500
1020010005	120	120 (120-A1-19)	1,400	3,500
1020010007	185	185 (185-A1-37)	1,400	2,400
1020010008	240	240 (240-A1-61)	1,400	1,500
1020010009	400	400 (400-A1-61)	1,800	1,500

Table 6

Packing Details for Aluminium-alloy Stranded Conductor

PEA Material No.	Code number	Nominal cross-sectional area (mm ²)	Reel size (mm)	Production length per reel (m)
1020030001	35	35 (35-A3-7)	1,000	4,500
1020030002	50	50 (50-A3-7)	1,000	3,100
1020030004	95	95 (95-A3-19)	1,400	4,500

Table 7

Packing Details for Aluminium Conductor Steel Reinforced

PEA Material No.	Code number	Nominal cross-sectional area (mm ²)	Reel size (mm)	Production length per reel (m)
1020020001	35	35/6 (35-A1/S1A-6/1)	1,000	3,500
1020020002	50	50/8 (50-A1/S1A-6/1)	1,000	3,000
1020020004	95	95/15 (95-A1/S1A-26/7)	1,400	3,500
1020020005	120	120/20 (120-A1/S1A-26/7)	1,400	3,000
1020020007	185	185/30 (185-A1/S1A-26/7)	1,400	2,000
1020020008	380	380/50 (380-A1/S1A-54/7)	1,400	1,000



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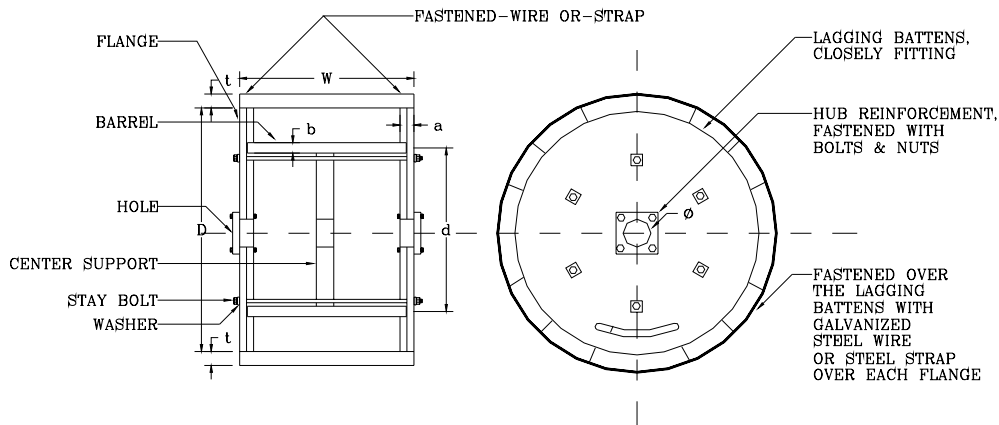
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WOODEN REELS



REEL SIZE mm	D mm	d (min) mm	W mm	a (min) mm	b (min) mm	t (min) mm	Ø mm	NUMBER OF STAY BOLTS (min)
-	-	-	-	-	-	-	-	-
1,000	980-1,020	500	660-700	50	19	25	75-100	6
1,400	1,380-1,420	710	875-915	63	25	38	75-100	6
1,800	1,780-1,820	965	880-920	75	35	38	75-100	6

Note :

1. Minimum clearance between cable and the lagging battens shall not be less than 25 mm .
2. Both ends of barrel battens shall be embedded in the flanges.
3. If PEA requests, the bidder has to state the reel manufacturer's name; and PEA reserves the right to observe the manufacturing process from time to time.



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C3 Schedule of detailed requirement

Invitation to Bid No.: ต.3กบญ.(จช.)e-bidding009/2562

Item	PEA Material No.	Quantity	Description
1	1020010001	-	Aluminium stranded conductors, 35 mm ² (35-A1-7).
2	1020010002	-	Aluminium stranded conductors, 50 mm ² (50-A1-7).
3	1020010004	-	Aluminium stranded conductors, 95 mm ² (95-A1-19).
4	1020010005	-	Aluminium stranded conductors, 120 mm ² (120-A1-19).
5	1020010007	-	Aluminium stranded conductors, 185 mm ² (185-A1-37).
6	1020010008	-	Aluminium stranded conductors, 240 mm ² (240-A1-61).
7	1020010009	-	Aluminium stranded conductors, 400 mm ² (400-A1-61).
8	1020020001	-	Aluminium conductors steel reinforced, 35/6 mm ² (35-A1/S1A-6/1).
9	1020020002	-	Aluminium conductors steel reinforced, 50/8 mm ² (50-A1/S1A-6/1).
10	1020020004	-	Aluminium conductors steel reinforced, 95/15 mm ² (95-A1/S1A-26/7).
11	1020020005	-	Aluminium conductors steel reinforced, 120/20 mm ² (120-A1/S1A-26/7).
12	1020020007	-	Aluminium conductors steel reinforced, 185/30 mm ² (185-A1/S1A-26/7).
13	1020020008	-	Aluminium conductors steel reinforced, 380/50 mm ² (380-A1/S1A-54/7).
14	1020030001	-	Aluminium-alloy stranded conductors, 35 mm ² (35-A3-7).
15	1020030002	-	Aluminium-alloy stranded conductors, 50 mm ² (50-A3-7).
16	1020030004	-	Aluminium-alloy stranded conductors, 95 mm ² (95-A3-19).
17	1020200000	3,208 กบ.	Armour tape, aluminium, cross-section 1 ± 0.1 mm x 10 ± 0.3 mm.
18	1020200002	6,420 กบ.	Tie wire, aluminium, diameter 4 ± 0.04 mm.

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C3 Schedule of detailed requirement

Item	PEA Material No	Quantity	Description
			<p>การไฟฟ้าส่วนภูมิภาคจะพิจารณาจัดซื้อ/จัดจ้างพัสดุที่ผลิตในประเทศไทย ทั้งนี้หากผู้เสนอราคาพัสดุที่ผลิตในประเทศไทย มีรายละเอียดคุณสมบัติเฉพาะไม่เป็นไปตามข้อกำหนดของการไฟฟ้าส่วนภูมิภาค หรือไม่มีผู้เสนอพัสดุที่ผลิตในประเทศไทย การไฟฟ้าส่วนภูมิภาคจะพิจารณาจัดซื้อ/จัดจ้างพัสดุที่ผลิตจากต่างประเทศต่อไป</p> <p>พัสดุที่ผลิตในประเทศไทย หมายความว่าถึง ผลิตภัณฑ์ที่ผลิตสำเร็จรูปแล้วโดยสถานที่ผลิตตั้งอยู่ในประเทศไทย</p>



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C4 Price schedule

Invitation to Bid No. ๓.๓๖๗๗.(๑๗.)e-bidding009/2562

Manufacturer :

Country of origin :

Trade-mark :

Item	PEA Material No.	Catalogue No.	Description	Quantity	Unit Cost (See details & conditions attached)	Total Cost (See details & conditions attached)
1	1020010001		Aluminium stranded conductors, 35 mm ² (35-A1-7).	-		
2	1020010002		Aluminium stranded conductors, 50 mm ² (50-A1-7).	-		
3	1020010004		Aluminium stranded conductors, 95 mm ² (95-A1-19).	-		
4	1020010005		Aluminium stranded conductors, 120 mm ² (120-A1-19).	-		
5	1020010007		Aluminium stranded conductors, 185 mm ² (185-A1-37).	-		
6	1020010008		Aluminium stranded conductors, 240 mm ² (240-A1-61).	-		
7	1020010009		Aluminium stranded conductors, 400 mm ² (400-A1-61).	-		
8	1020020001		Aluminium conductors steel reinforced, 35/6 mm ² (35-A1/S1A-6/1).	-		
9	1020020002		Aluminium conductors steel reinforced, 50/8 mm ² (50-A1/S1A-6/1).	-		
10	1020020004		Aluminium conductors steel reinforced, 95/15 mm ² (95-A1/S1A-26/7).	-		



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C4 Price schedule

Invitation to Bid No.ต.3กบญ.(จช.)e-bidding009/2562

Manufacturer :

Country of origin :

Trade-mark :

Item	PEA Material No.	Catalogue No.	Description	Quantity	Unit Cost (See details & conditions attached)	Total Cost (See details & conditions attached)
11	1020020005		Aluminium conductors steel reinforced, 120/20 mm ² (120-A1/S1A-26/7).	-		
12	1020020007		Aluminium conductors steel reinforced, 185/30 mm ² (185-A1/S1A-26/7).	-		
13	1020020008		Aluminium conductors steel reinforced, 380/50 mm ² (380-A1/S1A-54/7).	-		
14	1020030001		Aluminium-alloy stranded conductors, 35 mm ² (35-A3-7).	-		
15	1020030002		Aluminium-alloy stranded conductors, 50 mm ² (50-A3-7).	-		
16	1020030004		Aluminium-alloy stranded conductors, 95 mm ² (95-A3-19).	-		
17	1020200000		Armour tape, aluminium, cross-section 1 ± 0.1 mm x 10 ± 0.3 mm.	3,208 กก.		
18	1020200002		Tie wire, aluminium, diameter 4 ± 0.04 mm.	6,420 กก.		
			หมายเหตุ - กำหนดจุดจัดส่งที่ แผนกคลังพัสดุ การไฟฟ้าส่วนภูมิภาคจังหวัดยะลา - กำหนดส่งมอบงวดเดียวภายใน 60 วัน นับถัดจากวันที่ผู้ขายลงนามในสัญญา และภายในงวดสามารถทยอยจัดส่งได้			