



การไฟฟ้าส่วนภูมิภาค
PROVINCIAL ELECTRICITY AUTHORITY

PROVINCIAL ELECTRICITY AUTHORITY

TECHNICAL SPECIFICATION DIVISION

การกำหนดระยะเวลาในการส่งรายงานผลการทดสอบเฉพาะแบบ (Type test report)

และระยะเวลาในการจัดส่งตัวอย่างเพื่อประกอบการพิจารณาจัดหา

Specification No.:	-	Approved date: 21/12/2560	Rev. No.:	-	Form No.:	-	Page 1 of 1
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**เอกสารเพิ่มเติมแนบท้ายรายละเอียดสเปค
(ADDENDUM)**

เอกสารเพิ่มเติม (ADDENDUM) นี้ ให้ถือเป็นส่วนหนึ่งของรายละเอียดสเปคที่เอกสารฯ นี้ได้แนบอยู่ด้วย

1. การกำหนดระยะเวลาในการส่งรายงานผลการทดสอบเฉพาะแบบ (Type test report)

หากรายละเอียดสเปคกำหนดให้ผู้เสนอราคาจะต้องจัดส่งรายงานผลการทดสอบเฉพาะแบบ (Type test report) หรือหนังสือรับรองผลการทดสอบเฉพาะแบบ (Type test certificates) “ให้ผู้เสนอราคาจะต้องจัดส่งรายงานผลการทดสอบเฉพาะแบบ หรือหนังสือรับรองผลการทดสอบเฉพาะแบบมาพร้อมกับการยื่นเอกสารทางเทคนิค” แทนการกำหนดระยะเวลาจัดส่งรายงานฯ ที่ได้ระบุไว้ในรายละเอียดสเปค

ทั้งนี้ ยกเว้นบางพัสดุอุปกรณ์ที่ กฟภ. กำหนดยอมรับให้ทำการทดสอบเฉพาะแบบภายหลังจากที่ทำสัญญากับ กฟภ. แล้ว โดยคู่สัญญาจะต้องจัดส่งรายงานผลการทดสอบฯ ดังกล่าว ก่อนการส่งของนั้น ให้คงรายละเอียดไว้ตามเดิม

2. การกำหนดระยะเวลาในการจัดส่งตัวอย่าง (Sample) เพื่อประกอบการพิจารณาจัดหา

หากรายละเอียดสเปคกำหนดให้ผู้เสนอราคาจะต้องจัดส่งตัวอย่างพัสดุอุปกรณ์ (Sample) เพื่อประกอบการพิจารณาจัดหา “ให้ผู้เสนอราคาจะต้องจัดส่งตัวอย่างพัสดุอุปกรณ์ ภายใน 5 วันทำการ นับถัดจากวันเสนอราคา” แทนการกำหนดระยะเวลาจัดส่งตัวอย่างที่ได้ระบุไว้ในรายละเอียดสเปค



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TECHNICAL SPECIFICATION DIVISION

TOLERANCE

Specification No. -

Approved date : 31 ม.ค. 2562

Rev. No. : 01

Form No. : -

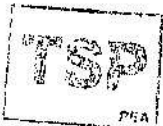
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ภาคผนวก (Addendum)

ที่	รายละเอียด	ค่าความคลาดเคลื่อน (มิลลิเมตร)		สัญลักษณ์	รูปที่
1	ระยะความยาวรวม (ขอบเหล็ก ถึง ขอบเหล็ก)	+ 5	- 3	L	(1)
2	ระยะจากจุดศูนย์กลางรู Slot ถึง ขอบเหล็ก	+ 5	- 3	A	(2)
	ระยะจากจุดศูนย์กลางรูกลม ถึง ขอบเหล็ก				
3	ระยะจากจุดศูนย์กลางรู Slot ถึง จุดศูนย์กลางรู Slot	+ 2	- 2	X1	(3)
4	ระยะจากจุดศูนย์กลางรูกลม ถึง จุดศูนย์กลางรูกลม	+ 1	- 1	X2	(4)
	ระยะจากจุดศูนย์กลางรูกลม ถึง จุดศูนย์กลางรู Slot				
5	ขนาดเส้นผ่านศูนย์กลางรูกลม 10 มิลลิเมตร ถึง 24 มิลลิเมตร	+ 1	- 1	DØ	(5)
	ขนาดรู Slot	+ 1	- 1	d1, d2	
6	ระยะเกลียวถึงปลาย Bolt	+ 8	- 0	B	(6)

หมายเหตุ :

1. ภาคผนวกนี้จะไม่นำไปใช้ ในกรณีดังต่อไปนี้
 - 1.1 มีการกำหนดค่าความคลาดเคลื่อนในข้อกำหนดทางเทคนิคแล้ว
 - 1.2 ข้อกำหนดทางเทคนิคได้อ้างอิงถึงมาตรฐานอุตสาหกรรม (มอก.) ต่างๆ ซึ่งมีการกำหนดค่าความคลาดเคลื่อนในมาตรฐานอุตสาหกรรม (มอก.) ดังกล่าวแล้ว
2. รูปแสดงตัวอย่าง และสัญลักษณ์ ให้ดูที่ Page 2 of 2
3. สำหรับการตรวจรับฮาร์ดแวร์ที่ต้องมีการประกอบใช้งานร่วมกับฮาร์ดแวร์อื่นๆ เช่น เหล็กประกบ, คอนเหล็ก เป็นต้น PEA ขอสงวนสิทธิ์ในการทดลองประกอบใช้งานร่วมกับฮาร์ดแวร์ดังกล่าว ในการตรวจรับด้วย





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TOLERANCE

Specification No. -

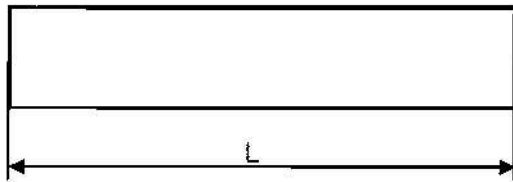
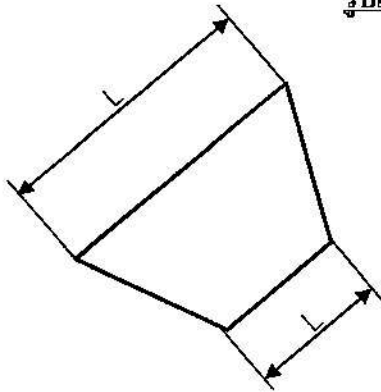
Approved date : 31 มี.ค. 2562

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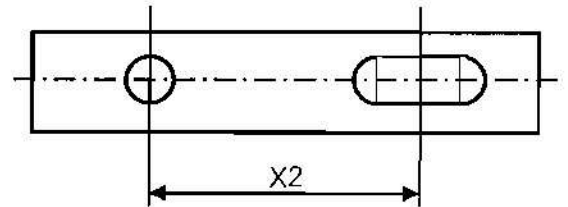
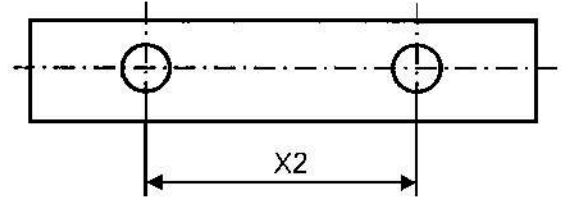
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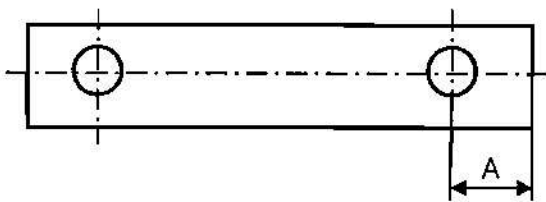
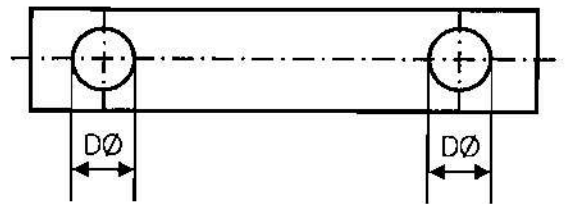
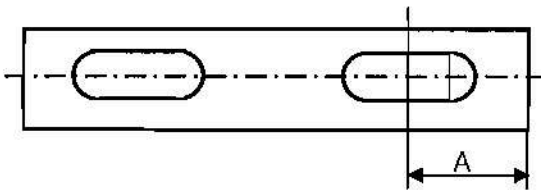
รูปแสดงตัวอย่าง และสัญลักษณ์



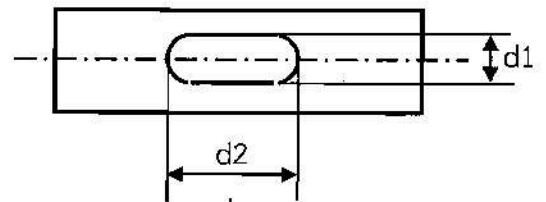
รูปที่ (1)



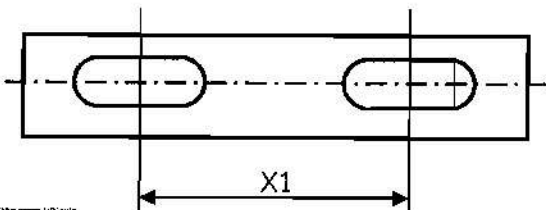
รูปที่ (4)



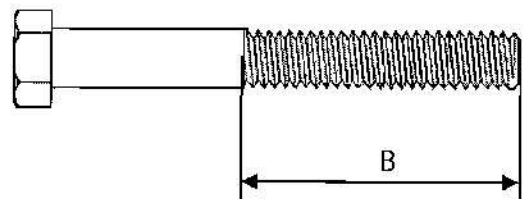
รูปที่ (2)



รูปที่ (5)



รูปที่ (3)



รูปที่ (6)





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PACKING DETAIL

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Addendum

This addendum is made to be a part of specifications it's attached.

1. Replace the packing detail only for the specific items in the specifications by the packing detail specified in **Table A1** below:

Table A1: Packing Detail

Item	Equipment	PEA's material No.	Packing method	Quantity per package/case	Number of packages/cases per pallet
Connectors and cable accessories:					
1	Hot line bail clamp (hot line stirrup clamp), for main aluminium conductor size 25 mm ² to 50 mm ²	1-02-033-0000	Sealed package	40	49
2	Hot line protected thread clamp for main aluminium conductor size 25 mm ² to 50 mm ²	1-02-033-0100	Sealed package	50	100
3	Hot line protected thread clamp for main aluminium conductor size 50 mm ² to 120 mm ²	1-02-033-0101	Sealed package	50	50
4	Compression splicing sleeve, full tension, for aluminium conductor size 50 mm ²	1-02-040-0002	Suitable package	100	100
5	Compression splicing sleeve, full tension, for aluminium conductor size 95 mm ²	1-02-040-0004	Suitable package	50	100
6	Compression splicing sleeve, full tension, for aluminium conductor size 185 mm ²	1-02-040-0007	Suitable package	30	50
7	Compression splicing sleeve, full tension, for aluminium conductor size 400 mm ²	1-02-040-0009	Suitable package	30	50
8	Compression splicing sleeve, partial tension, for aluminium conductor size 50 mm ²	1-02-041-0002	Suitable package	100	100
9	Terminal connector (lug), compression type, for aluminium conductor size 185 mm ²	1-02-041-0106	Suitable package	50	50
10	Pin terminal, for aluminium conductor size 50 mm ²	1-02-042-0400	Suitable package	50	100
Overhead line hardware:					
11	Angle steel crossarm, size 150x100x12 mm, length 4,500 mm	1-00-012-0002	Bundle	10	-
12	Channel steel crossarm, size 100x50x5 mm, length 4,200 mm	1-01-000-0103	Bundle	20	-
13	Channel steel crossarm, size 100x50x5 mm, length 4,500 mm	1-01-000-0104	Bundle	20	-
14	Channel steel crossarm, size 150x75x6 mm, length 2,800 mm	1-01-000-0300	Bundle	20	-
15	Channel steel crossarm, size 150x75x6.5 mm, length 4,000 mm	1-01-000-0301	Bundle	20	-



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PACKING DETAIL

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Item	Equipment	PEA's material No.	Packing method	Quantity per package/case	Number of packages/cases per pallet
16	Channel steel beam, size 150x75x6.5 mm, length 4,500 mm	1-01-000-0302	Bundle	20	-
17	Channel steel beam, size 150x75x6.5 mm, length 6,000 mm	1-01-000-0303	Bundle	20	-
18	Channel steel beam, size 150x75x6.5 mm, length 2,500 mm	1-01-000-0304	Bundle	20	-
19	Channel steel crossarm, size 150x75x9 mm, length 3,000 mm	1-00-012-0004	Bundle	20	-
20	Angle steel beam, size 65x65x6 mm, length 1,000 mm	1-01-001-0000	Bundle	100	-
21	Bolt, machine, M 16 x 170 mm	1-01-011-0201	Sack	100	56
22	Bolt, machine, M 16 x 300 mm	1-01-011-0204	Sack	80	56
23	Bolt, machine, M 16 x 350 mm	1-01-011-0205	Sack	80	56
24	Bolt, machine, M 16 x 450 mm	1-01-011-0207	Sack	40	56
25	Bolt, machine, M 16 x 500 mm	1-01-011-0208	Sack	40	50
26	Bolt, machine, M 16 x 600 mm	1-01-011-0209	Sack	40	50
27	Bolt, machine, hexagon head, M 16 x 75 mm	1-01-011-0400	Sack	200	56
28	Bolt, machine, hexagon head, M 16 x 550 mm	1-01-011-0401	Sack	40	50
29	Bolt, machine, hexagon head, M 16 x 600 mm	1-01-011-0402	Sack	40	50
30	Bolt, machine, hexagon head, M 16 x 650 mm	1-01-011-0403	Sack	30	50
31	Bolt, double arming, full thread, M 16 x 450 mm	1-01-012-0001	Sack	40	50
32	Bolt, double arming, full thread, M 16 x 500 mm	1-01-012-0002	Sack	40	50
33	Bolt, double arming, full thread, M 16 x 550 mm	1-01-012-0003	Sack	40	50
34	Bolt, double arming, full thread, M 16 x 600 mm	1-01-012-0004	Sack	40	50
35	Bolt, double arming, full thread, M 16 x 650 mm	1-01-012-0005	Sack	30	50
36	Bolt, double arming eye, M 16 x 450 mm	1-01-013-0001	Sack	40	56
37	Bolt, double arming eye, M 16 x 500 mm	1-01-013-0002	Sack	40	50
38	Bolt, double arming eye, M 16 x 650 mm	1-01-013-0005	Sack	30	50
39	Bolt, round eye, M 16 x 200 mm	1-01-014-0001	Sack	80	56
40	Bolt, round eye, M 16 x 250 mm	1-01-014-0002	Sack	80	56
41	Bolt, round eye, M 16 x 300 mm	1-01-014-0003	Sack	50	56
42	Bolt, oval eye, M 16 x 150 mm	1-01-015-0000	Sack	80	56
43	Bolt, oval eye, M 16 x 200 mm	1-01-015-0001	Sack	80	56
Insulators and accessories:					
44	Insulator, pin-post type, TIS 1251, Type 56/57-2	1-03-001-0101	Export package	2	30
45	Clevis-eye	1-03-014-0000	Suitable package	40	56
46	Ball-clevis, ANSI Type K	1-03-014-0001	Suitable package	30	56



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Item	Equipment	PEA's material No.	Packing method	Quantity per package/case	Number of packages/cases per pallet
47	Ball-hook, ANSI Type B	1-03-014-0002	Suitable package	40	56
48	Ball-clevis, ANSI Type B	1-03-014-0005	Suitable package	40	56
Surge arresters:					
49	LV surge arrester, 480 V, 5 kA	1-04-000-0300	Suitable package	100	5
Meters:					
50	Watt-hour meter, 15(45) A, 3-phase 4-wire	1-06-005-0107	Suitable corrugate-paper package	50	-
51	Watt-hour meter, 30(100) A, 3-phase 4-wire	1-06-005-0108	Suitable corrugate-paper package	50	-

2. Sacks used for packing equipment shall have enough durability and shall be made of hemp rope.
3. Bundle packing shall be using galvanized steel wires with diameter not less than 4 mm.
4. Pallets supplied to PEA shall have dimension not more than 1.1 m x 1.1 m (Width x Length) and the total height after containing the packages/cases shall be less than 1.5 m.

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Invitation to Bid No. :

Specification No. : RHDW-011/2556

C Material, equipment, and specifications for OVERHEAD LINE HARDWARE

C1 General material and packing instructions

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

1a Scope

These specifications cover line hardware for overhead line construction.

1b Standard

The overhead line hardware shall be in accordance with the latest TIS, VDE Regulations, DIN, and PEA Drawings attached to these specifications, or equivalent.

1c Principal requirement

The overhead line hardware shall be marked with manufacturer's name or trademark, except full thread double arming bolts, full thread stubbing bolts, and washers.

All ferrous materials shall be galvanized after manufacturing. Method of galvanizing and thickness of coating shall be according to the attached Table "THICKNESS OF ZINC COATING". Free samples shall be supplied on request. The samples will not be returned.

1d Packing

Each item should be packed in suitable packages in sets or pieces of 10, 50, 100, or that specified in Table "Packing Details for Overhead Line Hardware" (see page 3 of 3).

The gross weight of each package should not exceed 40 kg.

If there are several packages, the number of package shall be stamped on each package or each tag, as follows :

package number / total number of packages.

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C2 Material and packing data to be given by bidder

2a For each item offered, the following details shall be submitted with the bid :

Catalogue number.

Description of materials used for the component parts.

Surface finishing of the component parts.

Zinc coating in g/m^2 or μm ($1 \mu\text{m} = 0.001 \text{ mm}$).

Minimum breaking strength in kgf.

Weight in kg/set or piece.

2b For each item offered, a detail drawing with dimensions in mm shall be submitted with the bid.

2c Packing details

Packing method.

Number of sets or pieces in each package.

Dimensions of each package in cm.

Gross weight of each package in kg (should not exceed 40 kg).

Net weight of each package in kg.

Number of packages.

If several packages are contained in one big case, further details are required :

Number of packages in each case.

Dimensions of each case in cm.

Gross weight of each case in kg.

Number of cases.

-3-

Table

Packing Details for Overhead Line Hardware

PEA Material No.	Quantity Per Package	Packing Method
00120004, 01000103	18	Bundle
01200001, 01200002	20	Bundle
01010100, 01200004, 01200005	50	Bundle
01200007	150 (15 per layer)	Bundle
01110200, 01110201, 01140000, 01170001, 01180001	150	Sack
01110202, 01110203	100	Sack
01110204, 01110205, 01140001, 01140002	75	Sack
01110206, 01110207, 01110208, 01110401, 01120000, 01120001, 01120002, 01130000, 01130001, 01130002, 01140003	50	Sack
01180100, 01180201	500	Sack
01180301	5,000	Sack
02440102	30	Sack
02440103	60	Sack

Acceptance Tests for Threads of Steel Bolt, Anchor Rod, and Nut

1. Nuts shall be run the entire length of the bolt thread section without undue forcing with the fingers.
2. Strength tests shall be conducted with a minimum of three (3) full threads of thread section beyond the nut as shown in Fig. 1; failure shall not occur in the threaded section below the minimum strength (P).

Kind of Bolt, and Anchor Rod	Size	Minimum Strength, P (kgf)
Machine bolt, Double arming bolt, Double arming round eye bolt, Round eye bolt, Stubbing bolt, Oval eye bolt, Single strand eye bolt, Anchor rod	M 16	5,000
	M 20	9,000
	M 24	14,100

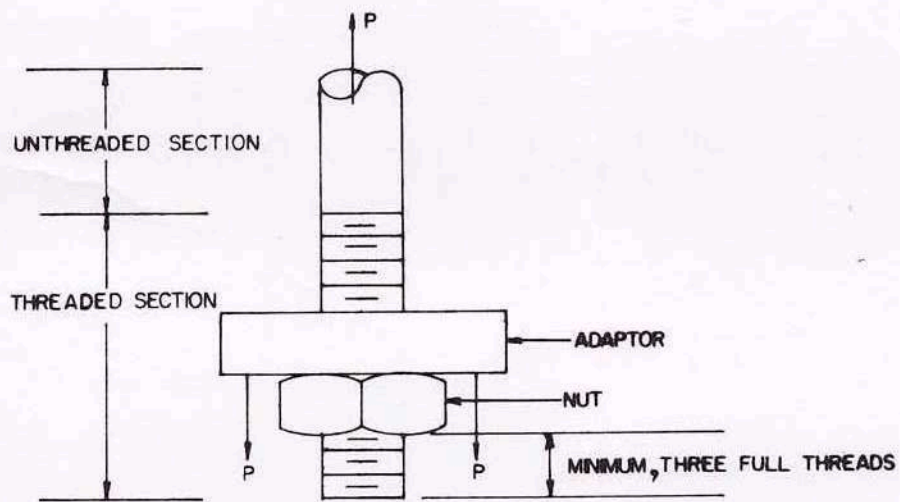


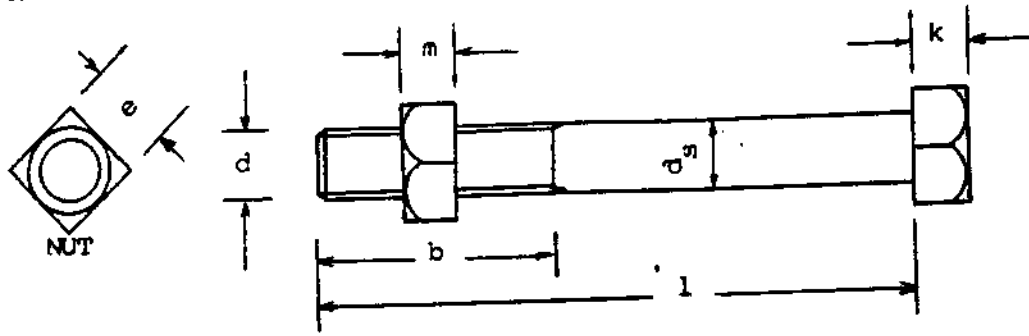
Fig. 1

Nominal Thread Diameters and Pitches of Steel Bolts and Nuts

Bolts and Nuts shall have nominal thread diameters(d) and coarse pitch (P) as specified in the table below :

Nominal Thread Diameter(d) in mm	Coarse Pitch(P) in mm
6	1
8	1.25
10	1.5
12	1.75
16	2
20	2.5
24	3

M 16 machine bolts shall have dimensions and tolerances as specified in the table below :



PEA Mat.No.	Machine Bolt Size	Dimensions in mm (Tolerances in mm)					
		d_s	l	b	k	e	m
01110200	M 16x130	16 (+ 0.95) (- 0.70)	130 (+ 5) (- 0)	35 (+ 6) (- 0)	10.5 (+2.0) (-0.9)	26 or 24 (+ 0) (- 0.8)	13 (± 0.9)
01110201	M 16x170	16 (+ 0.95) (- 0.70)	170 (+ 3) (- 2)	50 (+ 6) (- 0)	10.5 (+2.0) (-0.9)	26 or 24 (+ 0) (- 0.8)	13 (± 0.9)
01110202	M 16x200	16 (+ 0.95) (- 0.70)	200 (+ 3) (- 2.3)	50 (+ 6) (- 0)	10.5 (+2.0) (-0.9)	26 or 24 (+ 0) (- 0.8)	13 (± 0.9)
01110203	M 16x250	16 (+ 0.95) (- 0.70)	250 (+ 5) (- 2.3)	75 (+ 8) (- 0)	10.5 (+2.0) (-0.9)	26 or 24 (+ 0) (- 0.8)	13 (± 0.9)
01110204	M 16x300	16 (+ 0.95) (- 0.70)	300 (+ 5) (- 2.6)	75 (+ 8) (- 0)	10.5 (+2.0) (-0.9)	26 or 24 (+ 0) (- 0.8)	13 (± 0.9)
01110205	M 16x350	16 (+ 0.95) (- 0.70)	350 (+ 5) (- 2.85)	75 (+ 8) (- 0)	10.5 (+2.0) (-0.9)	26 or 24 (+ 0) (- 0.8)	13 (± 0.9)
01110206	M 16x400	16 (+ 0.95) (- 0.70)	400 (+ 5) (- 2.85)	100 (+ 8) (- 0)	10.5 (+2.0) (-0.9)	26 or 24 (+ 0) (- 0.8)	13 (± 0.9)
01110207	M 16x450	16 (+ 0.95) (- 0.70)	450 (+ 7) (- 3.15)	100 (+ 8) (- 0)	10.5 (+2.0) (-0.9)	26 or 24 (+ 0) (- 0.8)	13 (± 0.9)
01110208	M 16x500	16 (+ 0.95) (- 0.70)	500 (+ 7) (- 3.15)	150 (+ 8) (- 0)	10.5 (+2.0) (-0.9)	26 or 24 (+ 0) (- 0.8)	13 (± 0.9)

Note : Thread length (b) is measured from the end of the bolt to the last thread of nut entering.

TABLE THICKNESS OF ZINC COATING

STEEL CATEGORY/MATERIAL	STEEL THICKNESS RANGE (mm)	MINIMUM AVERAGE COATING THICKNESS (µm)
FASTENERS :		
- BOLT, PIN, NUT, LOCK NUT :		
- UP TO M 10	-	43
- OVER M 10	-	53
- WASHER, LOCKWASHER		
	< 4.76	43
	4.76 - 6.35	53
- ANCHOR ROD	-	80
CASTINGS :		
- SOCKET EYE, SOCKET CLEVIS, STRAIN CLAMP, etc.,	-	86
FORGED ARTICLES :		
- BALL HOOK, Y CLEVIS BALL, BALL CLEVIS, BALL EYE,	-	56
CLEVIS EYE, ANCHOR SHACKLES, etc.,		
STRUCTURAL SHAPE :		
- STEEL CHANNEL, STEEL ANGLE, CROSSARM STEEL,	< 1.6	45
BAYONET, GROUND ROD, etc.,	< 3.2	65
	3.2 - 6.4	85
	> 6.4	100
STRIP :		
- BRACE, GUY THIMBLE, GUY GUARD, RACK, CLEVIS,	< 1.6	45
STEEL BRACKET, PLATE STEEL, SPACER PLATE, etc.,	< 3.2	65
	< 4.8	75
	4.8 - 6.4	85
	< 6.4	100
PIPE :		
	≥ 3.2	75

NOTE : THICKNESS OF COATING OF SPECIMENS SHALL BE MEASURED WITH A MAGNETIC MEASURING INSTRUMENT "MICROTEST" OR "ELECTROMAGNETIC COATING THICKNESS GAUGE"



**PROVINCIAL ELECTRICITY AUTHORITY
ELECTRICAL AND MECHANICAL ENGINEERING DIVISION**

**Specification No.: RHDW-011/2556
OVERHEAD LINE HARDWARE**

Page 1 of 2

C3 Schedule of detailed requirement

Invitation to Bid No.: จ.3 กบพ.(จร.) EBD-007/2567

Item	PEA Material No.	Quantity	Description
3	1010110200	44,100 ea(s) รายการที่ 3	Bolt, machine, of mild steel, square head, similar to DIN 601, M 16, 130 mm long, length of thread 35 mm, complete with one (1) square nut, see Drawing No. K31-09072.
4	1010110201	47,500 ea(s) รายการที่ 4	Bolt, machine, of mild steel, square head, similar to DIN 601, M 16, 170 mm long, length of thread 50 mm, complete with one (1) square nut, Drawing No. K31-09072.
5	1010110203	130,900 ea(s) รายการที่ 5	Bolt, machine, of mild steel, square head, similar to DIN 601, M 16, 250 mm long, length of thread 75 mm, complete with one (1) square nut, Drawing No. K31-09072.
6	1010110204	125,000 ea(s) รายการที่ 6	Bolt, machine, of mild steel, square head, similar to DIN 601, M 16, 300 mm long, length of thread 75 mm, complete with one (1) square nut, Drawing No. K31-09072.
7	1010110206	1,800 ea(s) รายการที่ 7	Bolt, machine, of mild steel, square head, similar to DIN 601, M 16, 400 mm long, length of thread 100 mm, complete with one (1) square nut, Drawing No. K31-09072.
8	1010120001	3,100 ea(s) รายการที่ 8	Bolt, double arming, full thread, of mild steel, M 16, 450 mm long, complete with four (4) square nuts, see Drawing No. K31-09069.
10	1010130001	19,000 ea(s) รายการที่ 10	Bolt, double arming eye, of mild steel, forged round eye having 22 mm diameter hole, M 16, 450 mm long, length of thread 400 mm, complete with three (3) square nuts, minimum breaking strength not less than 5,000 kgf, see Drawing No. SO1-015/17007.
11	1010130002	10,000 ea(s) รายการที่ 11	Bolt, double arming eye, of mild steel, forged round eye having 22 mm diameter hole, M 16, 500 mm long, length of thread 450 mm, complete with three (3) square nuts, minimum breaking strength not less than 5,000 kgf, see Drawing No. SO1-015/17007.
12	1010130003	2,000 ea(s) รายการที่ 12	Bolt, double arming eye, of mild steel, forged round eye having 22 mm diameter hole, M 16, 600 mm long, length of thread 550 mm, complete with three (3) square nuts, minimum breaking strength not less than 5,000 kgf, see Drawing No. SO1-015/17007.
13	1010140001	7,200 ea(s) รายการที่ 13	Bolt, round eye, of mild steel, forged round eye having 22 mm diameter hole, M 16, 200 mm long, length of thread 150 mm, complete with two (2) square nuts, minimum breaking strength not less than 5,000 kgf, see Drawing No. SO1-015/19041.
14	1010160000	300 ea(s) รายการที่ 14	Bolt, stubbing, full thread, of mild steel, M 24, 600 mm long, complete with four (4) square nuts and two (2) flat washers 72x72x6 mm, 26 mm diameter hole.
15	1010160001	500 ea(s) รายการที่ 15	Bolt, stubbing, full thread, of mild steel, M 24, 800 mm long, complete with four (4) square nuts and two (2) flat washers 72x72x6 mm, 26 mm diameter hole.



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**Specification No.: RHDW-011/2556
OVERHEAD LINE HARDWARE**

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C3 Schedule of detailed requirement

Invitation to Bid No.: จ.3 กบพ.(จร.) EBD-007/2567

Item	PEA Material No.	Quantity	Description
16	1010160002	12,000 ea(s) รายการที่ 16	Bolt, stubbing, full thread, of mild steel, M24, 1,000 mm long, complete with four (4) square nuts and two (2) flat washers 72x72x6 mm, 26 mm diameter hole.
17	1010180001	25,000 ea(s) รายการที่ 17	Nut, eye, of mild steel, similar to DIN 582, forged eye 35 mm in diameter, thread for bolt M 16, minimum breaking strength not less than 5,000 kgf, see Drawing No. SO1-015/16004.
18	1010180100	1,500,000 ea(s) รายการที่ 18	Washer, square, flat, of steel, according to Table 6 of TIS 258, nominal size 16 (18 +0.7 / 0 mm diameter hole), 52 x 52 x 4.5 mm.
19	1010180201	38,600 ea(s) รายการที่ 19	Washer, square, curved, of mild steel, dimensions 60 x 60 x 5 mm, 22 mm diameter hole, see Drawing No. K31-09073.
21	1010200001	53,000 ea(s) รายการที่ 21	Brace, flat for crossarm, of flat steel 30x6x760 mm. see Drawing No. K31-09063
			<p>Note :</p> <ol style="list-style-type: none"> Pitches of steel bolts and nuts shall be according to the attached "Nominal Thread Diameters and Pitches of Steel Bolts and Nuts" Dimensions and tolerances of M 16 machine bolts shall be as specified in the attached "Dimensions and Tolerances of M 16 Machine Bolts" ONLY threads of steel bolt and nut shall meet acceptance tests specified in the attached "Acceptance Tests for Threads of Steel Bolt, Anchor Rod, and Nut" <p>หมายเหตุ</p> <p>กฟภ.ขอสงวนสิทธิ์ที่จะทำการทดสอบเพื่อดำเนินการตรวจรับ ณ ห้องทดสอบของ กฟภ.หรือ ที่โรงงานผู้ผลิต หรือ สถาบันทดสอบอิสระอื่นที่ กฟภ.ยอมรับ คู่สัญญาจะต้องรับผิดชอบ ค่าใช้จ่ายในการทดสอบเพื่อตรวจรับทั้งหมด ตาม รายละเอียดแนบเงื่อนไขการเรียกเก็บค่าบริการทดสอบประกอบการจัดซื้อพัสดุ (เพิ่มเติม)</p>



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**Specification No.: RHDW-011/2556
OVERHEAD LINE HARDWARE**

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Proposal Data

Invitation to Bid No.: จ.3 กบพ.(จร.) EBD-007/2567

Item	PEA Material No.	Description	Proposal Data
3	1010110200	BOLT, MACHINE M.16X130 MM.	Manufacturer's name: Type or model: Trade-mark: Country of origin:
4	1010110201	BOLT, MACHINE M.16X170 MM.	Manufacturer's name: Type or model: Trade-mark: Country of origin:
5	1010110203	BOLT, MACHINE M.16X250 MM.	Manufacturer's name: Type or model: Trade-mark: Country of origin:
6	1010110204	BOLT, MACHINE M.16X300 MM.	Manufacturer's name: Type or model: Trade-mark: Country of origin:
7	1010110206	BOLT, MACHINE M.16X400 MM.	Manufacturer's name: Type or model: Trade-mark: Country of origin:
8	1010120001	BOLT, DOUBLE ARMING, M.16X450 MM.	Manufacturer's name: Type or model: Trade-mark: Country of origin:
10	1010130001	BOLT, DOUBLE ARMING, ROUND EYE, M.16X450 MM.	Manufacturer's name: Type or model: Trade-mark: Country of origin:



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OVERHEAD LINE HARDWARE**

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Proposal Data

Invitation to Bid No.: จ.3 กบพ.(จร.) EBD-007/2567

Item	PEA Material No.	Description	Proposal Data
11	1010130002	BOLT, DOUBLE ARMING, ROUND EYE, M.16X500 MM.	Manufacturer's name: Type or model: Trade-mark: Country of origin:
12	1010130003	BOLT, DOUBLE ARMING, ROUND EYE, M.16X600 MM.	Manufacturer's name: Type or model: Trade-mark: Country of origin:
13	1010140001	BOLT, ROUND EYE, M.16X200 MM.	Manufacturer's name: Type or model: Trade-mark: Country of origin:
14	1010160000	BOLT, STUB, M.24X600 MM.	Manufacturer's name: Type or model: Trade-mark: Country of origin:
15	1010160001	BOLT, STUB, M.24X800 MM.	Manufacturer's name: Type or model: Trade-mark: Country of origin:
16	1010160002	BOLT, STUB, M.24X1,000 MM.	Manufacturer's name: Type or model: Trade-mark: Country of origin:
17	1010180001	NUT, EYE, M.16 DIN 582	Manufacturer's name: Type or model: Trade-mark: Country of origin:



**PROVINCIAL ELECTRICITY AUTHORITY
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**Specification No.: RHDW-011/2556
OVERHEAD LINE HARDWARE**

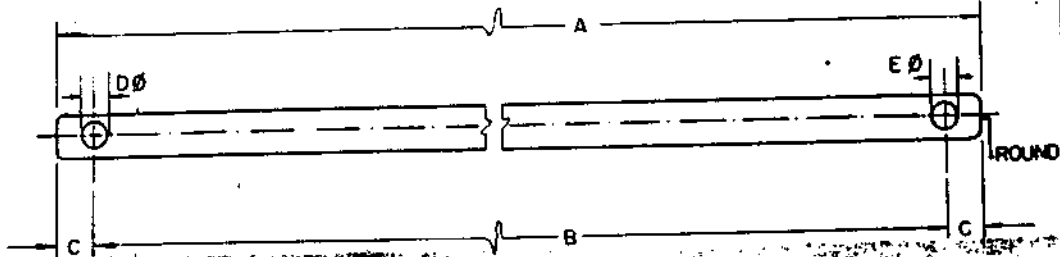
Page 3 of 3

Proposal Data

Invitation to Bid No.: จ.3 กบพ.(จร.) EBD-007/2567

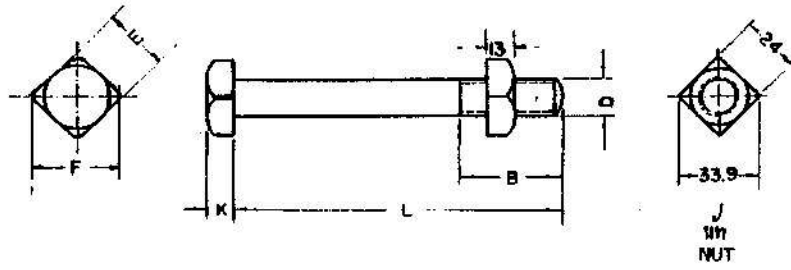
Item	PEA Material No.	Description	Proposal Data
18	1010180100	WASHER, PLAIN, SQUARE, 52X52X4.5 MM.	Manufacturer's name: Type or model: Trade-mark: Country of origin:
19	1010180201	WASHER, SQUARE, CURVED, 60X60X5 MM.	Manufacturer's name: Type or model: Trade-mark: Country of origin:
21	1010200001	BRACE, FLAT, FOR CROSSARM 30X6X760 MM.	Manufacturer's name: Type or model: Trade-mark: Country of origin:

PRELIMINARY



วัสดุ MAT.NO.	ขนาด DIMENSIONS IN MM.					วัสดุ, หมายเหตุ MATERIAL, SURFACE FINISHING, REMARKS
	A	B	C	D ^φ	E ^φ	
01200001	760	707	265	18	18	เหล็กแผ่น 30X6 เหล็กชุบสังกะสี ชนิดที่ 1 สำหรับคานาหน้า FLAT IRON 30X6, MILD STEEL HOT GALV.
01200002	1000	950	25	18	18	เหล็กแผ่น 40X6 เหล็กชุบสังกะสี ชนิดที่ 1 สำหรับคานาหน้า FLAT IRON 40X6, MILD STEEL HOT GALV.

GERMAN ADVISORY TEAM - PROVINCIAL ELECTRICITY AUTHORITY		
มาตรฐาน SCALE 1:5 FOR G. A. I.	วันที่ DATE 20/9/66 FOR P. E. A. Draw. by <i>Bunriap</i>	เหล็กประกอบเหล็ก 01 คานา, รั้วคานา, สลัก, วัสดุในทางยึด, คานาเหล็ก, วัสดุจับสายเหล็ก
<i>[Handwritten Signature]</i> 30-9/66		BRACE, FLAT, FOR CROSS-ARM 01 CROSS ARMS, BRACES, ANCHORS, GUYING MATERIALS, STEEL WIRE, CLAMPS FOR STEEL WIRE.
K 31		09063 SHEET NO. 1 OF 1



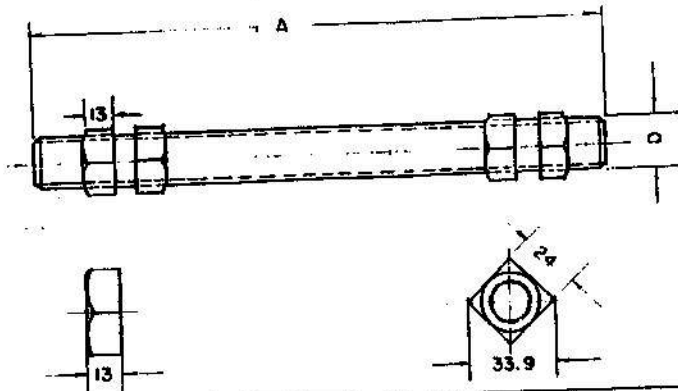
วัสดุ MAT. NO.	ขนาด DIMENSIONS IN MM						น้ำหนัก WEIGHT kg/100 Pcs.	วัสดุ, หมายเหตุ MATERIAL, SURFACE FINISHING, REMARKS.
	D	L	B	K	E	F		
0110200	M6	130	35	10.5	24	32	~ 24.4	วัสดุเหล็ก 4-6 ตาม มอก. 171 วัสดุ: เหล็กเกรด 4-6 STEEL, PROPERTY CLASS 4-6 ACC. TO TIS. 171 HOT DIP GALV. ACC TO P.E.A. STANDARD.
0110201	M6	170	50	10.5	24	32	~ 32.4	
0110202	M6	200	50	10.5	24	32	~ 40.2	
0110203	M6	250	75	10.5	24	32	~ 48	
0110204	M6	300	75	10.5	24	32	~ 56	
0110205	M6	350	75	10.5	24	32	~ 63.8	
0110206	M6	400	100	10.5	24	32	~ 71.6	
0110207	M6	450	100	10.5	24	32	~ 79.6	
0110208	M6	500	150	10.5	24	32	~ 87.6	

หมายเหตุ
 วัสดุที่ใช้เป็นขั้วต่อสายเคเบิล
 ต้องเป็นเหล็กเกรด 4-6
 สลักขันด้วยค้อน

NOTE: IF NOT OTHERWISE INDICATED
 THE MACHINE BOLT IS FITTED
 WITH ONE SQUARE NUT

GERMAN ADVISORY TEAM -- PROVINCIAL ELECTRICITY AUTHORITY

1:25 FOR P.E.A. 21-10-66	วันที่ DATE 22/9/66 FOR P.E.A. Drawn by	สลักขัน 02 สลักขัน: เตาไฟฟ้าสายเคเบิล
BOLT, MACHINE. 02 BOLTS, HARDWARE, STRAIN & SUSPENSION		K 31 09072 SHEET NO. 1 OF 1

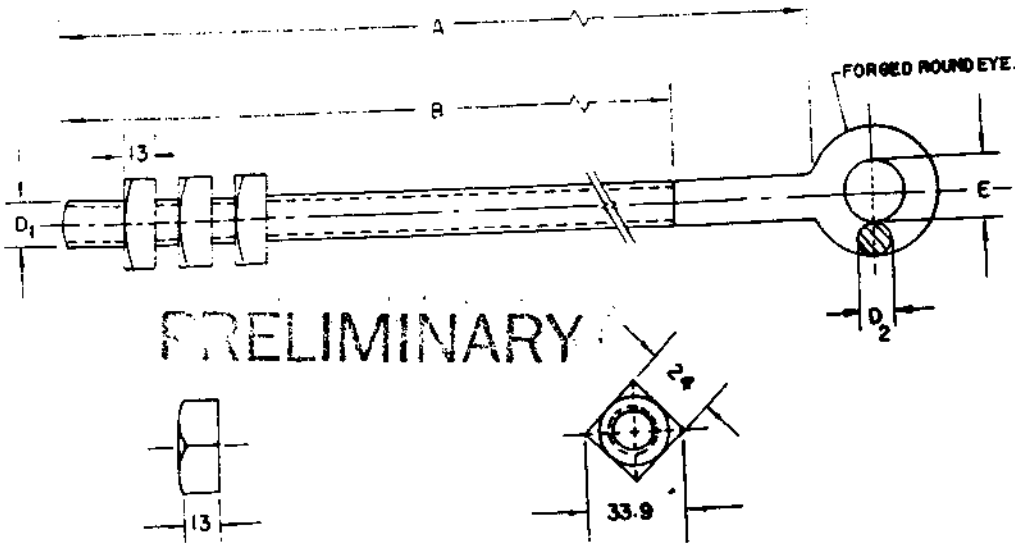


วัสดุ MAT. NO.	ขนาด DIMENSIONS IN MM.		น้ำหนัก/100 ชิ้น WEIGHT kg/100 PIECES	วัสดุ, การชุบ, MATERIAL, SURFACE FINISHING, REMARKS
	D	A		
01120000	M 16	400	~ 69.2	เหล็กกล้าคาร์บอน 4-6 ตาม มอก. 171 ชุบสังกะสีร้อนตาม มอก.
01120001	M 16	450	~ 77.0	STEEL, PROPERTY CLASS 4-6 ACC. TO TIS. 171 HOT DIP GALV. ACC. TO PEA. STANDARD.
01120002	M 16	500	~ 85.0	
01120004	M 16	600	~	

หมายเหตุ: วัสดุที่ระบุไว้เป็นของ
ที่ผลิตขึ้นโดยประเทศไทย
น้ำหนัก 4 กก

NOTE. IF NOT OTHERWISE INDICATED THE
DOUBLE ARMING BOLT IS FITTED
WITH FOUR SQUARE NUTS.

GERMAN ADVISORY TEAM - PROVINCIAL ELECTRICITY AUTHORITY		
ขนาด SCALE 1:5, 1:2.5 FOR G. A. P.	วันที่ DATE 22/9/66 FOR P.E.A. Drawn by K. S. S.	ชื่อโครงการ 02 สถานีจ่าย, เสาสายแรงดันสูง
		BOLT, DOUBLE ARMING 02 BOLTS, HARDWARE, STRAIN & SUSPENSION.
K 31	09069	SHEET NO. 1 OF 1



PRELIMINARY

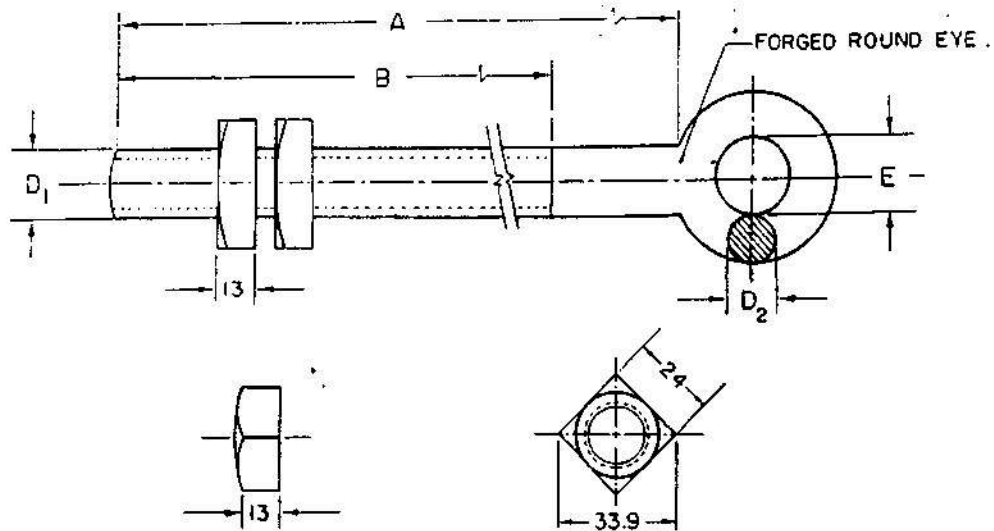
รหัสวัสดุ MAT. NO.	ขนาด DIMENSION IN MM.					แรงรับดึง กก. BREAKING STRENGTH (kgf)	น้ำหนัก กก. 100 กก. WEIGHT kg/100Pcs	วัสดุ MATERIAL, SURFACE FINISHING
	D ₁	A	B	E	D ₂			
01130000	M 16	400	350	22	12	5000	≈ 68	พดกทก
01130001	M 16	450	400	22	12	5000	≈ 107	งานดึงกระดิกานมาตรฐานจพทค STEEL
01130002	M 16	500	450	22	12	5000	≈ 145	HOT DIP GALV. ACC. TO PEA. STANDARD
01130003	M 16	600	550	22	12	5000	*	
01130004	M 16	550	500	22	12	5000		
01130005	M 16	650	600	22	12	5000		

หมายเหตุ :
ถ้าหากไม่ระบุไว้เป็นขมวด
ลัดกเกลียวทรงกลมประกอบด้วย
นัทสี่เหลี่ยม 3 ตัว

NOTE :
IF NOT OTHERWISE INDICATED THE
DOUBLE ARMING BOLT, ROUND EYE,
IS FITTED WITH THREE SQUARE NUTS

กองวิศวกรรม	การไฟฟ้าส่วนภูมิภาค	ใช้ตามแบบ K 31-09070
ผู้เขียน <i>[Signature]</i>	ผู้ว่าการ <i>[Signature]</i>	ถูกแทนโดยแบบ.....
ผู้สำรวจ <i>[Signature]</i>		เขียนเสร็จวันที่ 20.01.17
วิศวกร <i>[Signature]</i>	ลัดกเกลียว, ทรงกลม	นักแบบวันที่.....
หัวหน้าแผนก <i>[Signature]</i>		มีดเป็น <i>[Signature]</i>
ผู้อำนวยการกอง <i>[Signature]</i>	BOLT, DOUBLE ARMING, ROUND EYE.	มาตรฐาน <i>[Signature]</i>
รองผู้ว่าการฝ่ายเทคนิค <i>[Signature]</i>		แบบเลขที่ S01-015/17007
		หน้า <i>[Signature]</i> / ของจำนวน <i>[Signature]</i> หน้า

PRELIMINARY



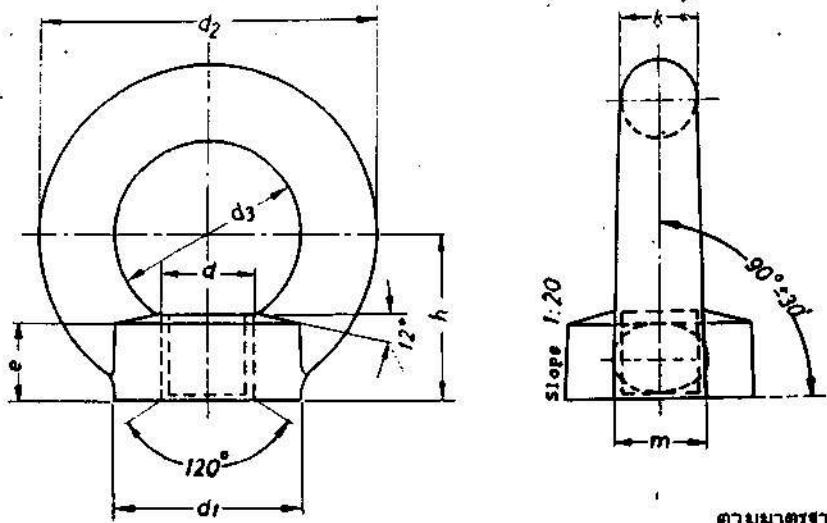
วัสดุเลขที่ MAT. NO.	มิติ มม. DIMENSION IN mm.					แรงประลัย กก. BREAKING STRENGTH (kgf)	น้ำหนัก กก./๑๐๐ชิ้น WEIGHT kg./100 Pcs.	วัสดุ มาตรฐาน MATERIAL, SURFACE FINISHING
	D ₁	A	B	E	D ₂			
01140000	M16	100	75	22	12	5,000	≈ 17	เหล็กกล้า
								อาบสังกะสีตามมาตรฐาน ของ กพท.
01140001	M16	200	150	22	12	5,000	≈ 34	STEEL
01140002	M16	250	200	22	12	5,000	≈ 42.5	HOT DIP GALV. ACC. TO PEA. STANDARD
01140003	M16	300	250	22	12	5,000	≈ 51	

หมายเหตุ : ถ้าหากไม่ระบุไว้เป็นอย่างอื่น
สลักเกลียวหัวกลมประกอบด้วย
พัตลีเหลี่ยม 2 ตัว

NOTE : IF NOT OTHERWISE INDICATED
THE BOLT, ROUND EYE, IS
FITTED WITH TWO SQUARE NUTS.

กองวิจัยและทดสอบ	การไฟฟ้าส่วนภูมิภาค		ใช้แบบ.....
ผู้เขียน <i>วิภากร</i>	ผู้ทำการ <i>วิภากร</i>	27 ก.ย. 19	ถูกอนุมัติแบบ.....
ผู้ตรวจสอบ <i>วิภากร</i>	01140000 - สลักเกลียว หัวกลม		เขียนเสร็จวันที่ 10/9/19
หัวหน้าแผนก <i>วิภากร</i>	01140003		แก้ไขวันที่.....
ผู้อำนวยการกอง <i>วิภากร</i>	01140000 - BOLT, ROUND EYE		วันที่.....
รองผู้อำนวยการฝ่ายเทคนิค	01140003		มาตรฐาน.....
			แบบเลขที่ SOI-015/19041
			แผ่นที่ 1 จากจำนวน 1 แผ่น

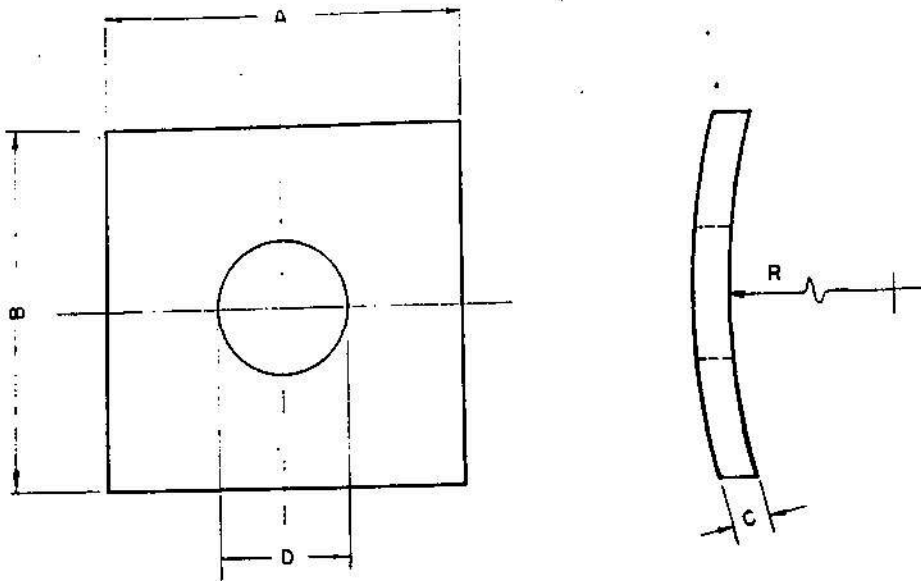
PRELIMINARY



ตามมาตรฐาน
ACC. TO DIN 582

วัสดุเลขที่ MAT NO.	มิติ มม. DIMENSIONS IN mm.								น้ำหนักกก/100 ชิ้น WEIGHT IN kg./100 Pcs.	วัสดุสภาพผิว หมายเหตุ MAT, SURF FINISHING, REMARKS
	d	d ₁	d ₂	d ₃	e	h	k	m		
01180001	M16	35	63	35	13	30	14	16	~ 23.8	วัสดุตามมาตรฐาน 4-1-2007 อบสังกะสี MAT. ACC TO 4-1-2007 DIN 582 HOT GALV.

กองวิศวกรรม	การไฟฟ้าส่วนภูมิภาค	ใช้แทนแบบ K31-09068
ผู้เขียน <i>สมชาย สวัสดิ์</i>	ผู้ทำการ <i>พลเอก</i>	ถูกแทนโดยแบบ.....
ผู้สำรวจ.....		เขียนเสร็จวันที่ 21.05.2566
วิศวกร <i>สมชาย</i>	ให้รูปท่าง..... ดิน 582	แก้แบบวันที่.....
หัวหน้าแผนก.....	03 สกรู, นัท, แกรน, ตะปู, ตะปู, ส่องขา	มิติเป็น..... มม.
ผู้อำนวยการกอง.....		มาตราส่วน.....
รองผู้ว่าการฝ่ายเทคนิค	NUT EYE,..... DIN 582	แบบเลขที่ SQ-05/16004
	03 SCREWS, NUT, WASHERS, NAILS, STAPLES	แผ่นที่..... ของจำนวน..... แผ่น



PRELIMINARY

วัสดุเลขที่ MAT. NO.	ขนาด มม DIMENSIONS IN MM.					น้ำหนัก/100 ชิ้น WEIGHT IN kg./100 Pcs.	วัสดุ, มาตรฐาน, หมายเหตุ MATERIAL, SURFACE - FINISHING, REMARKS
	A	B	C	D	R		
01180200	50	50	5	18	125	~8.82	เหล็กอ่อน, ชุบสังกะสี MILD STEEL, HOT GALV.
01180201	60	60	5	22	125	~12.65	เหล็กอ่อน, ชุบสังกะสี MILD STEEL, HOT GALV.

GERMAN ADVISORY TEAM - PROVINCIAL ELECTRICITY AUTHORITY			
มาตราส่วน SCALE	วันที่ DATE 23/9/66	หน่วยงานที่ติดตั้ง 03 สกรู, นัท, แม่แรง, ตะปู, ตะปูตอก	
FOR G. A. T.	FOR P. E. A. Draw. by	WASHER, CURVED, SQUARE. 03 SCREWS, NUTS, WASHERS, NAILS, STAPLES.	
<i>[Handwritten signature]</i>	<i>[Handwritten signature]</i>		
		K 31	09073 SHEET NO. 1 OF 1



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Invitation to Bid No.:

C Material, equipment, and specifications for 115 kV SURGE ARRESTERS

C1 General material and packing instructions

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

1a Scope

These specifications cover 115 kV surge arresters (Hereinafter called the surge arresters) of non-linear metal-oxide resistor type without spark gaps and accessories suitable for outdoor installation in 115 kV 50 Hz substation and transmission line.

1b Standards

The surge arresters shall be designed, manufactured and tested in accordance with the following standards:

Thai Industrial Standards (TIS):

TIS 2366-2551 [IEC 60099-4 Metal-oxide surge arresters without gaps for a.c. systems Edition 2.1 (2006-07)]

or International Electrotechnical Commission (IEC):

IEC 60099-4: 2009 Surge arresters – Part 4: Metal-oxide surge arresters without gaps for a.c. systems

And all other relevant standards, unless otherwise specified in these specifications.

PEA will also accept the surge arresters designed, manufactured and tested in accordance with the later edition of the above standard.

PEA will also accept the type test report in accordance with the previous edition of the above standards, if there is no significant change in any test items or no additional test item(s) compared with the above standards. On the other hand, if there is significant change in any test items or there are any additional test items, the previous edition type test report with the additional test report(s) of the significant change test item(s) and/or additional test item(s) will be also accepted.

1c Principal requirement

1c.1 Design

The surge arresters shall be of metal oxide type and housing of the arresters shall be silicone rubber.

Each arrester shall have pressure relieve design for relief internal over-pressure.





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The surge arresters shall be self-supporting base mounted and shall be designed for vertical mounting on solid hot-dip galvanized steel supporting structures provided by PEA and horizontal mounting on concrete or steel pole with steel plate.

The surge arresters and all associated equipment shall be designed and constructed for outdoor installation and operation and shall be capable of continuous operation at the specified ratings under the site and service condition stated in 1c.2.

1c.2 Site and service condition

The surge arresters shall be suitable for using in tropical climatic area and shall be capable of operating at its full ratings under site and service conditions as listed below:

Seismic activity	0.3g
Maximum wind speed	≈100 km/h
Maximum recorded rainfall	250 mm/day
Number of days with thunderstorm	100 days/year
Average rainfall	20 mm/day
Mean maximum annual relative humidity	94 %
Mean minimum annual relative humidity	79 %
Minimum daily relative humidity	17 %
Maximum temperature of surfaces exposed to sunbeam	80 °C
Mean minimum daily temperature	24 °C
Maximum ambient temperature	40 °C
Minimum ambient temperature	11 °C
Altitude	up to 1,000 m above sea level

1c.3 Ratings and characteristics

The surge arresters shall have rating and characteristics as specified in **Table 1**.

Table 1
Rating and characteristics of the 115 kV surge arresters

Ratings and characteristics	Unit	Requirement
Nominal system voltage	kV r.m.s.	115
Maximum system voltage	kV r.m.s.	123
Rated voltage (U _r)	kV r.m.s.	96
Continuous operating voltage (U _c)	kV r.m.s.	not less than 76
Rated frequency	Hz	50
Nominal discharge current (I _n) (wave 8/20 μs)	kA peak	10





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Ratings and characteristics	Unit	Requirement
Maximum residual voltage (U_{res}) at the nominal discharge current	kV peak	$2.85U_r$
Rated short-circuit current	kA r.m.s. (sym)	50
High-current impulse withstand (wave 4/10 μ s)	kA peak	100
Line discharge class	-	3
Thermal energy rating (W_{th})	kJ/kV (U_r)	7
Mechanical strength:		
- Specified Long-term Load (SLL)	Nm	not less than 2,500
- Specified Short-term Load (SSL)	Nm	not less than 3,700
Minimum creepage distance between live part to ground	mm	3,810
Line terminal	-	4-hole NEMA pad
Housing:		
- material	-	silicone rubber
- colour	-	gray

1c.5 Surge counter

Surge counter using for recording number of discharges and measuring leakage current of the surge arresters shall be provided if required by PEA (See “C3 Schedule of detailed requirement”).

1c.6 Manufacturer’s experience

The bidders shall give evidence about long term manufacturing and sales experience of the surge arrester’s manufacturer. The manufacturer of the proposed surge arresters shall have manufacturing and outside country sales experience of surge arresters with silicone rubber housing used in 115 kV power system, or above, of **at least ten (10) years**.

The manufacturer’s surge arresters supplying list indicating name and country of customers, model of the surge arresters, system voltage and year of delivery shall be submitted with the bid.

1d Tests and test reports

1d.1 Type tests

The surge arresters shall be passed type tests in accordance with TIS 2366-2551 or IEC 60099-4: 2009, or later edition, by the following test items ^D:

- (1) Insulation withstand test on the arrester housing
- (2) Residual voltage tests
- (3) Long-duration current impulse withstand tests
- (4) Operating duty tests
- (5) Short-circuit tests
- (6) Internal partial discharge tests





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- (7) Test of the bending moment
- (8) Radio interference voltage (RIV) test
- (9) Weather aging tests ²⁾

In addition, the following test item shall be carried out:

- Seismic withstand tests in accordance with IEEE 693 or equivalent. Alternatively, calculations of the surge arresters withstand capability against seismic action will be also accepted.

Note:

- ¹⁾ PEA will also accept the surge arresters passed the type tests in accordance with the later edition of the above standard which may have a different test items or test procedure comparing with TIS 2366-2551 or IEC 60099-4: 2009.
- ²⁾ The duration of the tests shall not be less than 1,000 hours (Test series A).

All items of the type tests shall be conducted or inspected by the acknowledged testing laboratories/institutes as following:

- (1) Laboratories/institutes which are members of the Short-circuit Testing Liaison (STL) or independent laboratories/institutes which are accredited according to TIS 17025 or ISO/IEC 17025 with the scope of accreditation covered the relevant test items, standards and equipment. The certification and scope of accreditation of the independent laboratories/institutes shall be submitted with the bid for consideration.
- (2) Thailand's national laboratories, institutes, universities and electric utilities, as follows:
 - National Metal and Materials Technology Center (MTEC)
 - Electrical and Electronic Products Testing Center (PTEC)
 - Thai Industrial Standards Institute (TISI)
 - Electrical and Electronics Institute (EEI)
 - Department of Science Service (DSS)
 - Testing Laboratory, Electrical Engineering Department, Faculty of Engineering, Chulalongkorn University
 - Electricity Generating Authority of Thailand (EGAT)
 - Metropolitan Electricity Authority (MEA)
 - Provincial Electricity Authority (PEA)
 - Other laboratories, institutes, universities or electric utilities approved by PEA

In case of the foreign manufacturers have experience of more than twenty (20) years in design, manufacture and sell the surge arresters with silicone rubber housing for using in system voltages of 115 kV or higher, PEA will accept type test report(s) conducted by the manufacturer's laboratory or other independent laboratories without qualification mentioned in (1) or (2). Documents showing the manufacturer's experience such as reference list indicating name and country of customers, model of the surge arresters, system voltage and year of delivery shall be submitted with the bid for consideration.





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The bidders or manufacturers who prefer to carry out the type tests of the surge arresters by the laboratories or by the manufacturer themselves without the qualification mentioned above, the detail of the test facilities of the laboratories or the manufacturer shall be submitted to PEA for approval before proceeding the tests and before the bid closing date. PEA reserves the right to send representatives to inspect and witness the tests with the cost of the bidders or manufacturers.

The type test report done by the laboratories in Thailand or local manufacturers shall be valid within five (5) years counted from the issued date in the test report to the bid closing date.

The type test report shall be submitted with the bid.

PEA will also accept other documents instead of the type test reports and type test certificates in the following conditions:

- (1) In case the proposed surge arrester has been supplied to PEA and get the order from PEA's Procurement Department or Substation Work Department or Transmission and Distribution System Work Department (from PEA's head office), the Purchase Order (PO) or contact with List of supplier or Proposal form, which not more than three (3) years counted from the issued date of the document to the bid closing date, can be submitted, or
- (2) In case the proposed surge arrester has been registered for PEA Product Acceptance, the not-expired registration certificate counted to the bid closing date can be submitted, or
- (3) In case the proposed surge arrester has been registered for Product lists for substation turnkey project, the not-expired registration certificate counted to the bid closing date can be submitted instead

However the document in case (1), (2) and (3) shall be proved that the surge arrester specified in the PO or List of supplier or Proposal form or registration certificate shall be the same product, type/model and all ratings as the proposed surge arrester for this bid.

The cost of all tests and reports shall be borne by the bidders/manufacturers/contractor.

1d.2 Routine tests

- (1) The surge arresters shall be passed the routine tests in accordance with TIS 2366-2551 or IEC 60099-4: 2009, or later edition, at least the following test items¹⁾:
 - (a) Measurement of reference voltage
 - (b) Residual voltage test
 - (c) Internal partial discharge test

Note:

¹⁾ PEA will also accept the surge arresters passed the routine tests in accordance with the later edition of the above standard which may have a different test items or test procedure comparing with TIS 2366-2551 or IEC 60099-4: 2009.





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(2) The surge counter shall be passed the routine tests in accordance with the relevant standard at least the following test items:

- (a) Surge counting device test
- (b) Leakage current meter test

The cost of all tests and reports shall be borne by the manufacturers/contractor.

1e Packing

Each set of the surge arresters including all accessories shall be packed in a suitable package.

The packages of the same item shall be packed in seaworthy wooden case(s) to avoid damage during transportation; or the packages of the same item shall be packed in suitable package(s) for delivery by container.

Each wooden case(s) shall be strong enough for stacking over with at least another one.

If the wooden case(s) is made of rubber wood (Yang-para or Hevea brasiliensis), the wooden parts shall be treated with wood preservative.





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C2 Material and packing data shall be submitted with the bid

The bidders have to submit the following data and details of the proposed 115 kV surge arrester and associated equipment.

- 2a Critical document of the proposed 115 kV surge arresters (See page 11 of 11)**
- 2b Design data and guarantee of the proposed 115 kV surge arresters (See page 9 of 11 to page 10 of 11)**
- 2c Design data and guarantee of the surge counter (If the surge counter is required, see “C3 Schedule of detailed requirement”), (See page 10 of 11)**
- 2d Drawing of the proposed 115 kV surge arresters including all accessories with main dimensions and tolerances in mm**
- 2e Detail of the proposed 115 kV surge arresters**
 - Catalogue
 - Specifications of materials used for the component parts
 - Surface finishing of component parts
- 2f Catalogue of the proposed surge counter (If the surge counter is required, see “C3 Schedule of detailed requirement”)**
- 2g Specification of materials used for the steel plate for mounting the surge arresters and drawing with dimensions and tolerances in mm (If the steel plate is required, see “C3 Schedule of detailed requirement”)**
- 2h List of routine tests of the proposed 115 kV surge arresters and surge counter (If the surge counter is required, see “C3 Schedule of detailed requirement”)**
- 2i Packing details**
 - Packing method (shown by drawing(s), and describe packing materials)
 - Number of sets in each package (one)
 - Dimensions of each package in cm
 - Gross weight of each package in kg
 - Net weight of each package in kg
 - Number of packages
 - Type of storage facility required (indoor/outdoor)





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Note: Conditions for documentation and consideration

The Contractor has to supply documents as follows:

- (1) One (1) set of instruction books for the transportation, storage, installation, operation and maintenance shall be packed together with each package **in English and/or Thai.**
- (2) One (1) set of test reports of type tests and routine tests of the proposed 115 kV surge arresters shall be send to the Authority, before shipment, at the following address:

**Substation Construction Division, Substation Maintenance Division, or
 Power system Construction Department**

Provincial Electricity Authority
 200 Ngam Wong Wan Road, Chatuchak
 Bangkok Metropolis 10900 Thailand





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Design data and guarantee of the proposed 115 kV surge arresters and accessories

1. 115 kV Surge arresters

Item.....

Description	Unit	Required Data	Proposed data
Manufacturer	-	-	
Manufacturer's type/model	-	-	
Country of origin	-	-	
Standards	-	TIS 2366-2551 (IEC 60099-4: 2006) or IEC 60099-4: 2009, or later edition	
Type tested	YES/NO	YES	
Manufacturing and sale experience of the manufacturer	YEARS	≥ 10	
Rated voltage (U _r)	kV r.m.s.	96	
Continuous operating voltage (U _c)	kV r.m.s.	not less than 76	
Rated frequency	Hz	50	
Nominal discharge current (I _n) (wave 8/20 μs)	kA peak	10	
Maximum residual voltage (U _{res}) at the nominal discharge current	kV peak	2.85U _r	
Rated short-circuit current	kA r.m.s. (sym)	50	
High-current impulse withstand (wave 4/10 μs)	kA peak	100	
Line discharge class	-	3	
Thermal energy rating (W _{th})	kJ/kV (U _r)	7	
Mechanical strength:			
- Specified Long-term Load (SLL)	Nm	not less than 2,500	
- Specified Short-term Load (SSL)	Nm	not less than 3,700	
Minimum creepage distance between live part to ground	mm	3,810	
Line terminal	-	4-hole NEMA pad	
Housing:			
- material	-	silicone rubber	
- colour	-	gray	
Seismic withstand tests/calculations	-	0.3g	





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Description	Unit	Required Data	Proposed data
Overall dimensions of arrester as per Drawing No:	-	-	
- length	mm	-	
- width	mm	-	
- height	mm	-	
Surge counter with leakage current indicator	YES/NO	(If the surge counter is required)	
Weight of one surge arrester including accessories	kg	-	

2. Surge counters (If the surge counter is required, see “C3 Schedule of detailed requirement”)

Item.....

Description	Unit	Required Data	Proposed data
Manufacturer	-	-	
Manufacturer’s type/model	-	-	
Country of origin	-	-	
Display for leakage current measurement	-	Build-in analog or digital display	
Display for recording the number of surge arrester discharges	digits	not less than 5	
Minimum counting current (8/20 μs)	A peak	not more than 200	
Measuring range of leakage current	mA	0.1 to 50 (peak/√2), or better	





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Critical documents of the proposed 115 kV surge arresters

The bidders shall fill data in the table below and shall submit with the bid.

Item	Required documents	Proposed technical document	Reference document (Page/Item)
1	Manufacturer's surge arresters supplying list indicating name and country of customers, model of the surge arresters, system voltage and year of delivery (See 1c.6)	<input type="checkbox"/> YES <input type="checkbox"/> NO	
2	Type test reports with detail of testing laboratories/institutes or manufacturer's experience of 115 kV surge arresters (See 1d.1), or	<input type="checkbox"/> YES <input type="checkbox"/> NO	
	The copy of previous Purchase Order (PO), or	<input type="checkbox"/> YES <input type="checkbox"/> NO	
	The copy of previous contact with List of suppliers, or	<input type="checkbox"/> YES <input type="checkbox"/> NO	
	The copy of previous contact with Proposal form, or	<input type="checkbox"/> YES <input type="checkbox"/> NO	
	The Product Acceptance certificate, or Product lists certificate	<input type="checkbox"/> YES <input type="checkbox"/> NO	
3	Design data and guarantee of the proposed 115 kV surge arresters (See 2b)	<input type="checkbox"/> YES <input type="checkbox"/> NO	
4	Design data and guarantee of the surge counter (If the surge counter is required), (See 2c)	<input type="checkbox"/> YES <input type="checkbox"/> NO	
5	Drawing of 115 kV surge arresters including all accessories with main dimensions and tolerances in mm (See 2d)	<input type="checkbox"/> YES <input type="checkbox"/> NO	
6	Catalogue(s) of the 115 kV surge arresters and all associated equipment (See 2e)	<input type="checkbox"/> YES <input type="checkbox"/> NO	
7	Specifications of materials used for the associated component parts (See 2e)	<input type="checkbox"/> YES <input type="checkbox"/> NO	
8	Surface finishing of component parts (See 2e)	<input type="checkbox"/> YES <input type="checkbox"/> NO	
9	Catalogue of surge counter (If the surge counter is required) (See 2f)	<input type="checkbox"/> YES <input type="checkbox"/> NO	
10	Specification of materials used for the steel plate for mounting the surge arresters and drawing with dimensions and tolerances in mm (If the steel plate is required), (See 2g)	<input type="checkbox"/> YES <input type="checkbox"/> NO	
11	List of routine tests (See 2h)	<input type="checkbox"/> YES <input type="checkbox"/> NO	
12	Packing details (See 2i)	<input type="checkbox"/> YES <input type="checkbox"/> NO	

Note:

The proposal without the critical documents above will be reject.





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C3 Schedule of detailed requirement

Invitation to Bid No.: จ.3 กบพ.(จร.) EBD-007/2567

Item	PEA Material No.	Quantity	Description
			Enclosed Drawing No.: SB1-015/65011 and K31-09072 ; four (4) sheets. หมายเหตุ กฟภ.ขอสงวนสิทธิ์ที่จะทำการทดสอบเพื่อดำเนินการตรวจรับ ณ ห้องทดสอบของ กฟภ.หรือที่ โรงงานผู้ผลิต หรือ สถาบันทดสอบอิสระอื่นที่ กฟภ.ยอมรับ คู่สัญญาจะต้องรับผิดชอบ ค่าใช้จ่ายในการทดสอบเพื่อตรวจรับทั้งหมด ตาม รายละเอียดแนบเงื่อนไขการเรียกเก็บค่าบริการทดสอบประกอบการจัดซื้อพัสดุ (เพิ่มเติม)