



การไฟฟ้านครหลวง
PROVINCIAL ELECTRICITY AUTHORITY

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ELECTRICAL AND MECHANICAL ENGINEERING DIVISION

HIGH-VOLTAGE INSULATING TAPE, SELF-FUSING EPR BASED

Specification No.: RMIS-105/2564

Approved date: 24 MAY 2021

Rev. No.: 2

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Invitation to Bid No.:

C Material, equipment, and specifications for High-voltage insulating tape, self-fusing EPR based

C1 General material and packing instructions

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

1a Scope

These specifications cover High-voltage insulating tape, self-fusing Ethylene Propylene Rubber (EPR) based designed for splicing and repairing of electrical wire and cables operating at voltages up to 69 kV.

1b Standard

The High-voltage insulating tape, self-fusing EPR based shall be manufactured and tested in accordance with following standard:

American Society for Testing and Materials (ASTM):

ASTM D4388: 2013 Standard specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes

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

PEA will accept High-voltage insulating tape that manufactured and tested in accordance with the later edition of the above standards.

PEA will also accept High-voltage insulating tape manufactured and tested in accordance with the previous edition of the above standard, 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 Properties

The properties of the proposed High-voltage insulating tape shall be in accordance with type three (3) classification of ASTM D 4388: 2013, or later edition, as specified in **Table 1**.





Table 1: Properties of the High-voltage insulating tape, self-fusing EPR based

Properties	Requirements	Test method
Dimension - length/roll - width - thickness	not less than 9 m* 19 mm ± 0.76 mm 0.76 mm ± 0.076 mm * The length of the tape of each roll shall be continuous.	ASTM D4325: 2013, or later edition
Tensile strength, min	1.7 MPa	
Elongation at break, min	700 %	
Dielectric strength, min	24 kV/mm	
Dissipation factor, max - after water immersion - after hot water immersion	0.05 0.05	
Permittivity, max - after water immersion - after hot water immersion	4 4	
Volume resistivity, min - 96 h at 23°C and 50 % RH - 96 h at 23°C and 96 % RH	10 ¹⁴ ohm-cm 10 ¹³ ohm-cm	
Fusion-Flag 2 mm, max	pass at 300 % elongation	
Ozone resistance	pass if no visible signs of cracks	
Heat exposure	pass at 130 °C	
UV resistance	Pass	

1c.2 Sample

The bidders shall submit at least one (1) sample for each proposed item within five (5) working days counted from bid closing date for consideration; otherwise, the proposal will be rejected.

PEA reserves the right to test the samples according to testing items and procedure specified in 1e.2. In case of the failing test results, the bidders shall be rejected.

The sample shall not be returned.



1c.3 Marking

The proposed High-voltage insulating tape shall be marked legibly and durably, as follows:

- (1) Name of manufacturer or trademark
- (2) Catalogue number or model
- (3) Width, thickness and length of the tape
- (4) Manufacturing date
- (5) Net weight
- (6) Purchase order number (PO), water resistance plastic sticker is acceptable.

Noted:

- Marking as specified in (1) shall be marked on tape core, plastic wrap and package box.
- Marking as specified in (2) to (4) shall be marked on plastic wrap and package box.
- Marking as specified in (5) and (6) shall be marked on package box.

1d Packing

Each High-voltage insulating tape roll shall be securely wrapped and sealed in a moisture-proof plastic and then shall be contained in a package box individually. The package boxes shall be packed in a carton box, the number of package boxes per carton box shall be not more than 50.

1e Tests and test reports

1e.1 Type test

The High-voltage insulating tap shall pass all test items for the properties specified in **Table 1** and the tests shall be conducted or inspected by the acknowledged independent testing laboratories/institutes as follows:

- (1) Independent 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 follow:
 - NSTDA Characterization and testing service center (NCTC)
 - Thailand Institute of Scientific and Technological Research (TISTR)
 - 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)

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- Testing Laboratory, Electrical Engineering Department, Faculty of Engineering, Chulalongkorn University
- Electricity Generating Authority of Thailand (EGAT)
- Metropolitan Electricity Authority (MEA)
- Provincial Electricity Authority (PEA)

(3) Other laboratories as follow:

- In case the foreign manufacturers have experience of more than twenty (20) years in design, manufacture and sell High-voltage insulating tape, self-fusing EPR based, 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 shall be submitted with the bid for consideration.
- The bidders or manufacturers who prefer to carry out the type tests of High-voltage insulating tape, self-fusing EPR based with other laboratories without the qualification mentioned above, the detail of laboratory and the test facilities 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 or witness the tests.

The type test reports conducted by the laboratories/institutes 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 reports conducted by the laboratories/institutes in other countries shall be valid within ten (10) years counted from the issued date in the test report to the bid closing date.

The type test reports shall include the necessary data as following:

- (1) Brand name of the tape
- (2) The catalogue number / type or model of the tape
- (3) Colour photograph of the tape before testing
- (4) Date of issue or date of approval

The cost of all tests and report shall be borne by the Bidders or manufacturers.

The type test reports shall be submitted with the bid.

PEA will also accept other documents instead of the type test reports in the following cases:

- (1) In case the proposed High-voltage insulating tape has been sold to PEA at PEA's Procurement Department (from PEA's head office). The bidder can submit the Purchase Order (PO) on the bid closing date, or
- (2) In case the proposed High-voltage insulating tape has been registered for PEA Product Acceptance⁽¹⁾, the Bidder can submit the valid registration certificate on the bid closing date, or

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(3) In case the proposed High-voltage insulating tape has been registered for Product lists for transmission and substation turnkey project⁽²⁾, the Bidder can submit the valid registration certificate on the bid closing date.

However the document in case (1), (2) and (3) mentioned above shall be proved by the bidding committee that High-voltage insulating tape specified in the PO or registration certificate is the same product, type/model and all ratings as the proposed High-voltage insulating tape for this bid.

Note: ⁽¹⁾ PEA Product Acceptance (PPA) is the process for enhancing quality of electrical apparatus which PEA procure by making quality control system and certification of product's quality by reliable Certification Body (CB). PPA is taken responsibility by Electrical Equipment Standard and Quality Control Division.

⁽²⁾ Product lists for transmission and substation turnkey project is the process of registration of electrical apparatus used in PEA's power system. Product lists is taken responsibility by Substation Project Management Division.

1e.2 Acceptance test

PEA reserves the right to have an acceptance tests conducted by PEA's laboratory or acknowledge independent testing laboratories as mentioned in 1d.1 or by manufacturer's factory qualified by PEA.

The cost of all tests shall be borne by the Contractor.

PEA's acceptance committee will randomly select the samples of the High-voltage insulating tape for each delivery lot with number as specified in Table 2.

Table 2: Number of samples for acceptance tests

Number per lot (Rolls)	Number of samples for acceptance test (Rolls)	Required test items (see Table 3)
Up to 49	1	Item 1 to 5
50 to 200	2	
201 to 500	3	
501 to 1,000	4	
1001 and more	5	

Note: - All samples shall be passed the tests.

- The samples shall be not returned and shall be not used in the system.

- After the tests, the additional High-voltage insulating tape with the equal number of the samples specified in Table 2, shall be supplied by the contractor with free of charge to complete the number of High-voltage insulating tape in the purchase contract.

Table 3: Acceptance test for High-voltage insulating tape

Item	Test items	Requirements	Test method
1	Dimension - length - width - thickness	not less than 9 m 19 mm ± 0.76 mm 0.76 mm ± 0.076 mm	ASTM D 4325: 2013 or later edition
2	Tensile strength, min	1.7 MPa* (see additional condition in Note below)	
3	Elongation at break, min	700 %	
4	Dielectric strength, min	24 kV/mm	
5	Fusion-Flag 2 mm, max	pass at 300 % elongation** (see additional condition in Note below)	

Note: - * Additional conditions for tensile strength test:

During the tests, tensile strengths of the tape shall be measured and recorded at the elongation of 100%, 200%, 300%, 400%, 500%, 600% and 700%. The tensile strength shall be increased by the increasing of the elongation. The graph of tensile strength and elongation shall be plotted and showed in the report.

- ** Colour photographs showing the sample preparation after wrapped on the mandrel shall be showed in the report.

If the sample(s) fail in the test, PEA will reject all High-voltage insulating tapes in the delivery lot.

1f Manufacturing process inspection

PEA reserve the right to send the representatives by PEA's expense to inspect manufacturing processes of the products during manufacturing with free access any time he deems necessary. The contractor shall facilitate PEA's representative to get access to where the tapes are being manufactured; otherwise, the contract shall be rejected.

The manufacturing factory shall have production machines at least by the following:

- Extrusion machine, for extruding the compound to the tape
- Calendering machine, for smoothing out the surface and shape to required thickness
- Winding machine, for winding to the jumbo roll
- Converting machine, for cutting to the required width

The contractor shall inform PEA in advance for the date of manufacturing in order that PEA can make an appointment with the contractor for inspecting the processes as above-mention.



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Ig Guarantee

The contractor has to guarantee quality of the High-voltage insulating tapes for two (2) years commencing from the date that the tapes are received by PEA. During the guarantee period, the contractor shall replace the defective High-voltage insulating tapes, such as unduly attaching of the tape to the separators or loss of their properties, with free of charge within fifteen (15) days after receiving the document of PEA.





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C2 Material and packing data shall be submitted with the bid:

The following critical documents and details shall be submitted with the bid:

Critical documents of the proposed High-voltage insulating tape shall be submitted with the bid for each item offered:

(The bidders shall fill the table below; otherwise, the proposal shall be rejected)

No.	Required technical document	Proposed technical document	Reference document (Folder/Page No.)
1	Guarantee performance data of High-voltage insulating tape, self-fusing EPR based (see Pages 9 of 9)	<input type="checkbox"/> YES <input type="checkbox"/> No	
2	Type test report (see 1d.1), or	<input type="checkbox"/> YES <input type="checkbox"/> No	
	Purchase Order (PO) from PEA's Procurement Department (from PEA's head office), or	<input type="checkbox"/> YES <input type="checkbox"/> No	
	Registration certificate of PEA Product Acceptance, or	<input type="checkbox"/> YES <input type="checkbox"/> No	
	Registration certificate of Product lists for transmission and substation turnkey project	<input type="checkbox"/> YES <input type="checkbox"/> No	
3	Catalogue	<input type="checkbox"/> YES <input type="checkbox"/> No	
4	Packing detail (see 1c.4)	<input type="checkbox"/> YES <input type="checkbox"/> No	





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Performance data and guarantee of the proposed High-voltage insulating tape, self-fusing EPR based

Manufacturers		
Country of origin		
Brand name		
Type or model		
Distributor		
Properties	Unit	Proposed data
Dimension		
- length	m	
- width	mm	
- thickness	mm	
Tensile strength, min	MPa	
Elongation at break, min	%	
Dielectric strength, min	kV/mm	
Dissipation factor, max		
- after water immersion	-	
- after hot water immersion	-	
Permittivity, max		
- after water immersion	-	
- after hot water immersion	-	
Volume resistivity, min		
- 96 h at 23°C and 50 % RH	ohm-cm	
- 96 h at 23°C and 96 % RH	ohm-cm	
Fusion-Flag 2 mm, max, at 300 % elongation	PASS/FAIL	
Ozone resistance	PASS/FAIL	
Heat exposure, at 130 °C	PASS/FAIL	
UV resistance	PASS/FAIL	
Guarantee period	year(s)	





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C3 Schedule of detailed requirement

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Item	PEA Material No.	Quantity	Description
1	1020180008	2,500 roll(s)	High-voltage insulating tape, self-fusing EPR based shall be designed for the splicing and repair of electrical wire and cables operating at voltages up to 69 kV with: Length : Not less than 9 m Width : 19 mm ± 0.76 mm Thickness : 0.76 mm ± 0.076 mm





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C4 Price schedule

Invitation to Bid No.: น.3กบญ.(จช.)EB3/2566

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	1020180008		High-voltage insulating tape, self-fusing, EPR based shall be designed for the splicing and repair of electrical wire and cables operating at voltage up to 69 kV with Length : m Width : mm Thickness : mm	2,500 roll(s)	set(s)	

