การไฟฟ้าส่วนภูมิภาค

#### ELECTRICAL AND MECHANICAL ENGINEERING DIVISION

#### **H - TYPE COMPRESSION TAP CONNECTORS**

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#### **Invitation to Bid No:**

#### C Material, equipment, and specification for H-TYPE COMPRSSION TAP CONNECTORS

#### C1 General material and packing instructions

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

#### 1a Scope

These specifications describe requirements for design, manufacture, tests and supply of H-type compression tap connectors used in low-voltage distribution system.

#### 1b Standards

Except otherwise specified elsewhere in the specification, the connectors shall be manufactured and tested in accordance with the following standards

ANSI/NEMA CC1-2009	Electric power connection for substations
ANSI C119.4-2016	Connectors for use between aluminum-to-aluminum and aluminum-to-copper
	conductors designed for normal operation at or below 93°C and copper-to-
	copper conductors designed for normal operation at or below 100°C

PEA will also accept connector tested in accordance with the later edition of the above standards.

PEA will also accept the design 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 design 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

#### Service conditions and installation

The H-type compression tap connector shall be designed and constructed for outdoor installation, and suitable for operation under the following conditions:

Altitude	:	up to 1,000 m above sea level	
Ambient air temperature	:	up to 50 <sup>°</sup> C	
Average relative humidity in any one year	:	up to 94%	
Climatic condition	:	tropical climate	





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#### 1.c.2 General

The H-type compression tap connectors shall be suitable for connection between LV main aluminium conductor and tap copper conductor which sizes as specified in "C3 Schedule of detailed requirement". The dimensions of the connectors shall be according to Drawing No.SA2-015/25001.

Entire contact surface of the connectors shall be thoroughly filled with oxide inhibiting contact grease, the minimum thickness of the grease shall be 0.5 mm.

Surface of the connectors shall be smooth, consistent, no dirt, no blemishes, no cracks and no rust.

#### 1.c.3 Construction and characteristics

The finished product of the proposed H-type compression tap connector shall be of aluminum grade 1050, 1100 or 1350, which shall be standard grade or designation in accordance with international standards, i.e. SAE, AISI, JIS, ASTM, ANSI, UNS, ISO or BS. It shall be suitable for using with both aluminum to aluminum connection and aluminum to copper connection.

#### 1c.4 Marking

Each connector shall be marked by mean of engraving, knurling, hot stamping or laser marking on the body at least data listed below, which is clearly visible and durable foil-coated marking, i.e. printing with toner or laser toner with foil-coated, is not accepted.

- (1) Manufacturer's name or Trademark
- (2) Model or catalog/drawing number
- (3) Type and size of conductor to be used with
- (4) Purchase order number

#### 1c.5 Samples

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

PEA's bids committee will initially check the sample by comparing with the color photograph in the proposed type test report and PEA's specification. PEA's bid committee will reject a proposal if there are any parts of sample differing from the color photograph in the type test report and PEA's specification.

PEA reserves the right to test the sample in visual and dimension check and hardness test according to **1e.3 Acceptance tests,** in case of the failing test results, the proposal will be rejected.



The sample will not be returned after consideration, the sample of the successful bidder will be used as a reference sample in acceptance process. The supplied connectors with a different design compared with the reference sample shall be rejected.

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#### 1d Packing

The supplied connectors shall be packed in a seal plastic envelope, by quantity of 1, 5, 10, 20, or appropriate per envelope, for protection the connectors and its compound from dust and moisture.

The envelopes shall be packed in paper box and each paper box shall be marked with purchase order number, contractor's name, manufacturer's name or trademark, model or catalog/drawing number type and size of conductor to be used with, number of connectors in the box and net weight. The box shall be wrapped and sealed with a moisture-proof material.

#### 1e Test and Test report

#### 1e.1 Type tests

The proposed H-type compression tap connector shall be passed all type test items with reference standards and test method as specified in Table 1.

### Table 1

Type test items of H-type compression tap connector

No.	Test items	Reference standard/Test method	Description
1 1	Visual and dimension check	PEA's specification	See (1)
2	Chemical composition test	Optical emission spectrometer	See (2)
3	Temperature rise test	ANSI/NEMA CC1	See (3)
4	Conductor damage test	ANSI C119.4	See (4)
5	Hardness test	Brinell hardness test	See (5)





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Before the type tests are proceeded, manufacturer shall submit following detail to PEA for approval:

- Ten (10) samples of H-type compression tap connector (All sample shall be signed by PEA's representative)
- Drawing showing specified dimensions and all information according to Drawing No.SA4-015/25001.
- Standard to be used as a reference of grade or designation of the H-type compression tap connector
- The details of tools and compression dies used for compressing the h-type-compression tap connector shall be submitted as following:
  - The catalogue of tools and compression die which specify the model and the name of manufacturer.
  - The dimensions of compression die are required in case of the manufacturer of h-typecompression tap connector uses his own compression die in the type test processes

One sample of H-type compression tap connector will be kept by PEA (by Electrical Equipment Standard and Quality Control Division) and will be used as a reference sample for bid consideration and acceptance processes.

The other samples will be sent to acknowledged independent testing laboratories/institutes, which have qualification mentioned below, for type tests in accordance with the test items specified in **Table 1**.

#### (1) Visual and dimension check

Four (4) samples are required for the test. Each sample shall have markings in accordance with clause **1c.4 Marking**, except purchase order number is not required. Dimensions of each sample shall be measured and recorded. The dimensions of all samples shall be according to Drawing **No.SA2-015/25001** and according to manufacturer's drawing.

#### (2) Chemical composition test

One (1) sample is required for the test. The H-type compression tap connector shall be tested by means of optical emission spectrometer for verification grade or designation of aluminium alloy, which shall be aluminium grade or designation specified in accordance with **1.c.3 Construction** and characteristics.

**Note:** PEA will accept result of the chemical composition test with tolerance of -10% of minimum value of each substance specified in reference standard, except aluminium shall have a minimum value according to the reference standard.





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#### (3) Temperature rise test

Four (4) samples are required for the test. The temperature rise test shall be according to ANSI/NEMA CC1. Temperature rise of all connectors shall not exceed the temperature rise of tested conductor.

#### (4) Conductor damage test

Two (2) samples are required for the test. The conductor damage test shall be according to ANSI C119.4.

#### (5) Hardness test

Two (2) samples are required for the test.

The type tests of the H-type compression tap connectors shall be conducted or inspected by the acknowledged independent testing laboratories/institutes as follows:

- (1) Independent at 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, standard and equipment. The certification and scope of accreditation of the independent laboratories/institutes shall be submitted with the bid for consideration.
- (2) Laboratories, institutes, universities and electric utilities, as follows:
  - 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)
  - Testing Laboratory, Electrical Engineering Department, Faculty of Engineering, Chulalongkorn University
  - Electricity Generating Authority of Thailand (EGAT)
  - Metropolitan Electricity Authority (MEA)
  - Provincial Electricity Authority (PEA)
  - Laboratory of manufacturers approved by PEA
- (3) Other laboratories as follow:
  - In case the foreign manufacturers have experience of more than twenty (20) years in design, manufactures and sell H-type compression tap connector, PEA will accept type test report(s) conducted by the manufacturer's laboratory or other independent laboratories without



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qualificat	ion mentioned in (1) or (2). Docu	ments showing	the manufacturer's ex	perience such as

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 H-type compression tap connector 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 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:

- In case the proposed connectors have 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 connectors have been registered for PEA Product Acceptance<sup>(1)</sup>, the Bidder can submit the valid registration certificate on the bid closing date, or
- (3) In case the proposed connectors have been registered for Product lists for transmission and substation turnkey project<sup>(2)</sup>, 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 connectors specified in the PO or registration certificate is the same product, type/model and all ratings as the proposed connectors for this bid.

- Note: <sup>(1)</sup> 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.
  - <sup>21</sup> 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.

#### The type test reports shall consist of the necessary as follow; otherwise, it is not accepted by PEA



- (1) The test results of all test items as specified in Table 1.
- (2) The details of tools and compression dies used for compressing the H-type compression tap connector in the type test processes shall be declared as following:

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ecification No., RCDL-020/2504	Approved date. 2 4 DEC 2021	Rev. 100. 2	Form rot.			
<ul> <li>Dimension</li> <li>his own of</li> <li>(3) Outline dra</li> <li>Drawing N</li> <li>(4) The color p</li> <li>Manufact</li> <li>Size of color</li> <li>Model or</li> </ul>	e of tools and compression die whic ons of compression die are require compression die in the type test pr awing of the H-type compressio <b>o.SA2-015/25001</b> hotographs of H-type compressio turer's name or Trademark onductor to be used with catalog/drawing number H-type on hibiting contact grease	ed in case of the ocesses. n tap connecto n tap connector	e manufacturer of th r, showing dimensi as following:	e connectors uses		
	ompression tap connector shall	nass visual ar	d dimension check	c and other tests		
	anufacturer's standard.	pass visual al	la annension eneer			
independent tes <b>The cost of all</b> PEA's acceptar	the right to have acceptance test ting laboratories as mentioned in <b>tests shall be borne by the Cont</b> acce committee will randomly select pecified in <b>Table 2</b> .	1e.1 or by manu ractor.	facturer's factory qu	ualified by PEA.		
Perfug	TABONIN'I'I'					
	Table		at a			
	Number of samples fo	or acceptance to	-313			
Number of H	I-type compression tap connecto	or for each deli	very lot Numl	per of samples		
	(sets)			(sets)		
	Up to 100 101 - 500			2 3		
	501 - 1,000			4		
	More than 1,000 5					



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All sample(s) shall pass acceptance test items No. 1 - 5 sequentially, with reference standards and test method as specified in **Table 3**. PEA reserve the right not to continue the tests if the sample is failed the test in any test items.

#### Table 3

#### Acceptance test items of H-Type compression tap connectors

No	Test Items	Reference standard /Test method	Acceptance criteria
1	Visual check	PEA's specification	<ul> <li>Surface of all samples shall be smooth, consistent, no dirt, no blemishes, no cracks and no rust</li> <li>All sample shall have markings in accordance with</li> </ul>
	) สิงสรี และหมุดิ ( เ เหตุ	นะ ผั้ง ของรากอา (กวิษาไป คุณที่ป	clause 1c.4 Marking
	ณกษณฑิมสาราช ครือปัจจะมีป	ในการบัฒนระมบันการมุมการไปเห	- Entire contact surface of all samples shall be thoroughly
	ละกันไป (สุดภูมิเลียะ กิจ ลิยมา 	naturation ontant, eo art(n) norm	filled with oxide inhibiting contact grease, the minimum thickness of the grease shall be 0.5 mm
2	Dimension check	PEA's specification	Dimension of all sample shall be according to manufacturer's drawing and shall be according to Drawing
VARE	a is it inflation sources	number of the second	No. SA2-015/25001
3	Chemical composition test	Optical emission spectrometer	According to Chemical composition test specified in <b>Table 1</b> .
	Wethin Gestleun (*)	อาวาศสารณ์สารทางสารค์เรา	Note: Testing only one (1) sample per lot
4	Hardness test	Brinell hardness test	The test result shall be within 10% tolerance of the hardness test result in the type test report.
	na ser a la serie de la serie de	ada darmalikyasinka peru	Note: Testing only one (1) sample per lot
5	Assembly test	PEA's specification	The samples shall be suitable to assemble with the conductor to be used with.





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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 h-type compression tap connector 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	Propo Tech docu	nical	Reference documen (Page No.)		
00109	Type test report (see 1e.1) or	<b>YES</b>	No No	uceur resura		
	Purchase Order (PO) from PEA's Procurement Department (from PEA's head office) (see <b>1e.1</b> ) or	<b>YES</b>	No No	ring (snales que sea num, ilsus		
	Product acceptance certificate (see 1e.1)	<b>YES</b>	No No	ublionanansi		
	Product lists certificate (see 1e.1)	<b>YES</b>	D No			
2	Drawing(s) of the proposed H-type compression tap connectors, showing dimensions (see 1c.2) (Drawing(s) by using PEA's drawings shall not be accepted)	U YES	No No	nennagaa gerar e		
3	Packing detail (see 1d)	U YES	No No			





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# C3 Schedule of detailed requirement

# Invitation to Bid No.:

	Item	PEA Material No.	Quantity	Description
	1	1020320009	pc(s)	Connector, compression tap, H-type, connection of main aluminium conductor to tap copper conductor and main aluminium conductor to tap aluminium conductor, see Drawing No. <b>SA2-015/25001</b> , with : Main : diameter range of 3.57 mm to 4.50 mm (size 10 mm <sup>2</sup> to 16 mm <sup>2</sup> ) Tap : diameter range of 2.25 mm to 3.57 mm (size 4 mm <sup>2</sup> to 10 mm <sup>2</sup> ) Minimum Length : 25 mm
	2	1020320010	pc(s)	Connector, compression tap, H-type, connection of main aluminium conductor to tap copper conductor and main aluminium conductor to tap aluminium conductor, see Drawing No. <b>SA2-015/25001</b> , with : Main : diameter range of 5.90 mm to 9.06 mm (size 25 mm <sup>2</sup> to 50 mm <sup>2</sup> ) Tap : diameter range of 1.78 mm to 2.76 mm (size 2.5 mm <sup>2</sup> to 6 mm <sup>2</sup> ) Minimum Length : 30 mm
(10)	3	1020320011	pc(s) 99,000 EA	Connector, compression tap, H-type, connection of main aluminium conductor to tap copper conductor and main aluminium conductor to tap aluminium conductor, see Drawing No. <b>SA2-015/25001</b> , with : Main : diameter range of 5.90 mm to 9.06 mm (size 25 mm <sup>2</sup> to 50 mm <sup>2</sup> ) Tap : diameter range of 4.50 mm to 7.56 mm (size 16 mm <sup>2</sup> to 35 mm <sup>2</sup> ) Minimum Length : 40 mm
(11)	4	1020320012	pc(s) 61,000 EA	Connector, compression tap, H-type, connection of main aluminium conductor to tap copper conductor and main aluminium conductor to tap aluminium conductor, see Drawing No. <b>SA2-015/25001</b> , with : Main : diameter range of 8.33 mm to 12.60 mm (size 50 mm <sup>2</sup> to 95 mm <sup>2</sup> ) Tap : diameter range of 8.33 mm to 12.60 mm (size 50 mm <sup>2</sup> to 95 mm <sup>2</sup> ) Minimum Length : 55 mm
		III		



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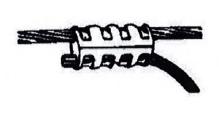
#### Specification No.: RCBL-026/2564 : H-TYPE COMPRESSION TAP CONNECTORS

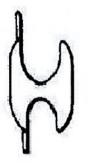
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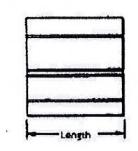
# C3 Schedule of detailed requirement

#### **Invitation to Bid No.:**

-	PEA			
	Itam	Material	Onertite	Description
	Item		Quantity	Description
	5	No. 1020320013	pc(s)	Connector, compression tap, H-type, connection of main aluminium conductor to tap copper conductor, see Drawing No. <b>SA2-015/25001</b> , with : Main : diameter range of 9.73 mm to 11.45 mm (size 70 mm <sup>2</sup> to 95 mm <sup>2</sup> ) Tap : diameter range of 5.10 mm to 7.56 mm (size 16 mm <sup>2</sup> to 35 mm <sup>2</sup> ) Minimum Length : 40 mm
(12)	6	1020320014	pc(s) 62,000 EA	Connector, compression tap, H-type, connection of main aluminium conductor to tap copper conductor, see Drawing No. <b>SA2-015/25001</b> , with : Main : diameter range of 6.95 mm to 8.33 mm (size 35 mm <sup>2</sup> to 50 mm <sup>2</sup> ) Tap : diameter range of 3.12 mm to 4.05 mm (size 6 mm <sup>2</sup> to 10 mm <sup>2</sup> ) Minimum Length : 30 mm
(13)	7	1020320015	pc(s) 40,000 EA	Connector, compression tap, H-type, connection of main aluminium conductor to tap copper conductor, see Drawing No. <b>SA2-015/25001</b> , with : Main : diameter range of 9.73 mm to 11.45 mm (size 70 mm <sup>2</sup> to 95 mm <sup>2</sup> ) Tap : diameter range of 3.12 mm to 4.05 mm (size 6 mm <sup>2</sup> to 10 mm <sup>2</sup> ) Minimum Length : 30 mm
		III		Note : Enclosed Drawing No. <b>SA2-015/25001</b> .







Cross section

Side view

	CONDUCTOR RANGE			SIMILAR TO								
PEA MATERIAL No.	MAIN SIZES (mm²)	TAP SIZES (mm²)	MINIMUM LENGTH (mm)			KEARNEY		НШМАС		PENN-UNION		
		NHPL 2		CATALOGUE NO.	DIE INDEX	CATALOGUE ND.	DIE INDEX	CATALOGUE ND.	DIE INDEX	CATALOGUE ND.	DIE INDEX	
1020320009	10-16	4-10	25	YPC2A8U	BG	421-82	<u>5</u>	UB 214	<u>5</u> 8	-	-	
1020320010	25-50	2.5-6	30	-	-	424-82	0	OB 2014	0	K0-R24	0	
1020320011	25-50	16-35	40	YHO-150	0	508-82	0	OB 103	0	K0-R06	0	
1020320012	50-95	50-95	55	YHD-300	D3	504-82	0	DB 2020	D	K D-R04	D	
1020320013	70-95	16-35	40	YHD-200	D3	502-82	0	DB 202	0	K D-R02	D	
1020320014	35-50	6-10	30	YPC26R 8U	0	428-82	0	-	-	K0-R24	0	
1020320015	70-95	6-10	30	YPC26R 8U	0	-	_	-	_	-	-	



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Speci	Specification No.: RCBL-026/2564 : H-TYPE COMPRESSION TAP CONNECTORS								
C4 Pr	C4 Price schedule Manufacturer :								
Invita	ation to Bid No	o.:		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	1020320009		Connector, compression tap, H-type, connection of main aluminium conductor to tap copper conductor, see Drawing No. SA2-015/25001, with : Main : diameter range of mm to mm. Tap : diameter range of mm to mm. Minimum length mm.	pc(s)					
2	1020320010		Connector, compression tap, H-type, connection of main aluminium conductor to tap copper conductor, see Drawing No. SA2-015/25001, with : Main : diameter range of mm to mm. Tap : diameter range of mm to mm. Minimum length mm.	pc(s)					
) 3	1020320011 III		Connector, compression tap, H-type, connection of main aluminium conductor to tap copper conductor, see Drawing No. SA2-015/25001, with : Main : diameter range of mm to mm. Tap : diameter range of mm to mm. Minimum length mm.	pc(s) 99,000 EA	(เสนอราคาในระเ	บบ e-GP เท่านั้น)			



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	C4 Pr	ice schedule			Manufacturer :					
	Invita	tion to Bid No	.:		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)	4	1020320012		Connector, compression tap, H-type, connection of main aluminium conductor to tap copper conductor and main aluminium conductor to tap aluminium conductor, see Drawing No. SA2-015/25001, with : Main : diameter range of mm to mm. Tap : diameter range of mm to mm. Minimum length mm. Connector, compression tap, H-type, connection of main aluminium conductor to tap copper conductor and main aluminium conductor to tap aluminium conductor, see Drawing No. SA2-015/25001, with : Main : diameter range of mm to	pc(s) 61,000 EA pc(s) pc(s)	(เสนอราคาในระบบ	e-GP เท่านั้น)			
		III								



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	Specification No.: RCBL-026/2564 : H-TYPE COMPRESSION TAP CONNECTORS									
	C4 Pr	ice schedule			Manufacturer :					
	Invita	tion to Bid No.	o.:		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)			
(12)	6	1020320014		Connector, compression tap, H-type, connection of main aluminium conductor to tap copper conductor and main aluminium conductor to tap aluminium conductor, see Drawing No. SA2-015/25001, with : Main : diameter range of mm to mm. Tap : diameter range of mm to mm. Minimum length mm.	pc(s) 62,000 EA	(เสนอราคาในระ	บบ e-GP เท่านั้น)			
(13)	7	1020320015		Connector, compression tap, H-type, connection of main aluminium conductor to tap copper conductor and main aluminium conductor to tap aluminium conductor, see Drawing No. SA2-015/25001, with : Main : diameter range of mm to mm. Tap : diameter range of mm to mm. Minimum length mm.	40,000 EA					
		III								