

Jicable - WETS' 05

AC Electric Power

**Long lengths EHV electrical links by
AC insulated power cables**

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Answers to the questionnaire

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Answers to the questionnaire (page 1/13)

Answer N°	Expert (Company)	Country of the link	System	Power Voltage Length	Compensation
1a 1b	D. Dubois (Nexans France) R. Granadino (REE Spain) E. Zaccone (Pirelli)	Spain / Morocco	REE Spain / Morocco Line	700 MW 400 kV 29 km	150 Mvar spanish side 2 x 125 Mvar Marrocan side 800 m ² /reactor bank 2,4 M€/réactor bank
2 a 2 b	J.L. Parpal (IREQ) Ch. Royer (Hydro Quebec)	Canada	H.Q.	-	No link > 10 km
3	R. Grünbaum (ABB Power Technolgies AB)	Canada	B.C. Hydro British Colombia to Vancouver- Island Line	....MVA 500 kV 37 km	135 Mvar inductive to 165 Mvar capacitive 2900 m ²
4	R. Grünbaum (ABB Power Technolgies AB)	Singapore	PUB Singapore	2 x 140 MVA 230 kV km	100 Mvar inductive (500 m ²) 50 Mvar inductive (400 m ²)
5	R. Zaccone (Pirelli)	Italy	132 kV ASM Brescia Ricevitrice W to N Line	2 x 140 MVA 132 kV 10 km	No compensation

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Answers to the questionnaire (page 2/13)

Answer N°	Expert (Company)	Country of the link	System	Power Voltage Length	Compensation
6	R. Granadino (REE Spain) E. Zaccone (Pirelli)	Spain	REE San Sebastian de los Reyes - Loeches - Morata Line	1390 MW / 1720 MW 400 kV 12,7 km	150 Mvar at each end 800 m ² / reactor bank 2,4 M€/réactor bank
7	S. Aljinovic J. Antic (HEP Trans.)	Croatia	HEP Trans. Medvidbad - Prapratna Line	70 MW 110 kV 16,34 km	No Compensation
8	Y. Maugain (RTE)	France	RTE	-	No link > 10 km with compensation
9	M. Endo (Tohoku Electric Power Co)	Japan	Tohoku Electric Power Co	-	No link > 10 km
10	S. Meregalli (CESI)	Italy	ENEL Network Calabria - Sicilia Line	1000 MVA 380 kV 8,3 km	150 Mvar = 50 Mvar / phase (56 m ² / phase + 7,8 m ² neutral reactor) 1 M€

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Answers to the questionnaire (page 3/13)

Answer N°	Expert (Company)	Country of the link	System	Power Voltage Length	Compensation
11	S. Meregalli (CESI)	Italy	ENEL Network Camin - Bassanello Line	170 MVA 132 kV 10,2 km	No compensation
12	E. Zaccone (Pirelli)	Italy	132 kV Elettra-Acegas Trieste Servola - Padriciano Line	170 MVA 132 kV 11 km	No Compensation
13	R.Špehar J. Antic (HEP PrP Opatija)	Croatia	HEP Trans. Krk - Rab Line	100 MVA 110 kV 10,666 km	No Compensation
14	S. Aljinovic J. Antic (HEP Trans.)	Croatia	HEP Trans. Vasibaka - Deda Line	102 MW 110 kV 11,027 km	No Compensation
15	S. Sakuma (VISCAS Corp.)	Japan	Honshi Interconnecting Transmission Line	2 x 1200 MW 500 kV 22,2 km	250 Mvar - 240 m ²

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Answers to the questionnaire (page 4/13)

Answer N°	Expert (Company)	Country of the link	System	Power Voltage Length	Compensation
16a 16b 16c	S. Sakuma (VISCAS Corp.) Z. Iwata (Furukawa Elect. Co.) Atsushi Toya (TEPCO)	Japan	TEPCO Shin Toyosu Line	900 MW / cct (future : 1200 MW / cct) 500 kV 39,8 km	16a : 300 Mvar / cct 5m x (20 to 25 m) / cct 16c : 2 x 300 Mvar 180 m ² and 220 m ² 760 MJPY and 960 MJPY
17a 17b	S. Sakuma (VISCAS Corp.) Atsushi Toya (TEPCO)	Japan	TEPCO Katsusan Setagaya Line	302 MW 275 kV 32,5 km	150 Mvar 120 m ² 360 MJPY
18	S. Sakuma (VISCAS Corp.)	Japan	CEPCO (C is Chubu) Ama Matsugae Line	2 x 660 MW 275 kV 32,5 km	Information expected
19	S. Sakuma (VISCAS Corp.)	Japan	CEPCO (C is Chubu) Chita Daini Minami- Buheicho Line	2 x 420 MW 275 kV 26,8 km	Information expected

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Answers to the questionnaire (page 5/13)

Answer N°	Expert (Company)	Country of the link	System	Power Voltage Length	Compensation
20	Heon-Eui Lim (KEPCO)	Korea (Incheon)	KEPCO 345 kV Sin Bupyeong Trans. Line	523 MVA 345 kV 17 km	No compensation
21	Heon-Eui Lim (KEPCO)	Korea (Seoul)	KEPCO 345 kV Sin Seongdong Trans. Line	523 MVA 345 kV 17 km	2 x 100 Mvar 2 x 128 m ² 525 000 \$
22	Heon-Eui Lim (KEPCO)	Korea (Busan)	KEPCO 345 kV Nam Busan Trans. Line	523 MVA 345 kV 22 km	2 x 200 Mvar 2 x 150 m ² 1 083 000 \$
23a 23b	Heon-Eui Lim (KEPCO) S. C. Hwang (LG Cable Ltd)	Korea (Seoul) (2003)	KEPCO 345 kV Yeongseo - Yeongdeungpo Trans. Line	955 MVA 345 kV 10 km	200 Mvar at one end, 150 m ² , 1,1 M\$

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Answers to the questionnaire (page 6/13)

Answer N°	Expert (Company)	Country of the link	System	Power Voltage Length	Compensation
24	Soren Damsgaar Mikkelsen (ELTRA)	Denmark (Northern Jutland) (2004)	ELTRA 400kV, 140km Aarhus-Aalborg Trans. Line	1300 MVA (2000 MVA) 400 kV 4,5 + 2,5 + 7 km = 14 km (3 siphons)	2 inductive reactors : 100 and 140 Mvar at the end of two câble sections.
25	A. Ericsson J. Karlstrand (ABB Power Technologies AB)	Sweden	-	-	No link > 10 km Longest AC link between Sweden and Denmark : 400 kV, 7 km, No Compensation.
26	Hans-Jürgen Uhr (Bewag)	Germany (Berlin)	Bewag 380kV Berlin Diagonal	1120 MVA/ cct 380 kV 31,4 km (7,6-7,6-8,1-8,1) OF cables	80 Mvar Oil filled shunt reactor 90 m ² + 50 m ² (Cool. Equipt.)
27	Hans-Jürgen Uhr (Bewag)	Germany (Berlin)	Bewag 380 kV Berlin Diagonal	1150 MVA / cct 380 kV 23,8 km (6,5-6,5-5,4-5,4) XLPE cables	80 or 120 Mvar Oil filled shunt reactor 90 m ² + 50 m ² (Cool. Equipt.)

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Answers to the questionnaire (page 7/13)

Answer N°	Expert (Company)	Country of the link	System	Power Voltage Length	Compensation
28	Aanhaanen Gert (TenneT Zuid-Holland)	The Netherlands	TZH 150 kV network Krimpen - Rotterdam Zuidwijk (kV 243)	300 MW 150 kV 11,7 km	No compensation
29	Fred Steennis (Kema)	The Netherlands	DELTA N.V. 50 kV Goes - Zierikzee 1	30 MVA 50 kV 19,6 km	No compensation.
30	Fred Steennis (Kema)	The Netherlands	DELTA N.V. 50 kV Goes - Zierikzee 2	30 MVA 50 kV 19,8 km	No compensation
31	Fred Steennis (Kema)	The Netherlands	DELTA N.V. 50 kV Goes - Terneuzen Zuid 2	30 MVA 50 kV 37,35 km	No compensation

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Answers to the questionnaire (page 8/13)

Answer N°	Expert (Company)	Country of the link	System	Power Voltage Length	Compensation
32	Fred Steennis (Kema)	The Netherlands	DELTA N.V. 50 kV Goes - Terneuzen Zuid 3	30 MVA 50 kV 36,62 km	No compensation
33	Fred Steennis (Kema)	The Netherlands	DELTA N.V. 50 kV Zierikzee - Tholen	30 MVA 50 kV 18,8 km	No compensation
34	Fred Steennis (Kema)	The Netherlands	DELTA N.V. 50 kV Kruiningen - Tholen	30 MVA 50 kV 12,2 km	No compensation
35	Bruno Fainaru	Israel	-	-	The longest underground HV line in Israel is 7,5 km length in Jerusalem district. No Compensation
36	Angelo Manuel Sarmiento (EDP)	Portugal	EDP	-	No link > 10 km

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Answers to the questionnaire (page 9/13)

Answer N°	Expert (Company)	Country of the link	System	Power Voltage Length	Compensation
37	Atsushi Toya (TEPCO)	Japan	TEPCO Yokohama-Kouhoku Line	700 MW 275 kV 20 km	150 Mvar 190 m ² 260 MJPY
38	George Bucea (Transgrid)	Australia (Sydney)	Transgrid 330 kV Sydney South-Beaconsfield West Line	660 MVA 330 kV 19,7 km	Yes via switched shunt reactors. 330 kV : 150 Mvar 132 kV : 100 Mvar
39	George Bucea (Transgrid)	Australia (Sydney)	Transgrid 330 kV Sydney South-Haymarket Line	900 MVA 330 kV 28 km	Yes via switched shunt reactors. 330 kV : 250 Mvar 132 kV : 100 Mvar
40	Gunnar Evenset (Nexans)	Norway	Shore to Troll A Oil Platform	... MVA 52 kV 67 km (Longest in Norway)	Information expected

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Answers to the questionnaire (page 10/13)

Answer N°	Expert (Company)	Country of the link	System	Power Voltage Length	Compensation
41	Mikhail Shuvalov (VNIIEP)	Russia	-	-	No cable systems in Russia with reactive power compensation
42	S. Kugelmeier (SVM Infrasturctur GmbH) D. Rittinghaus (energycableconsult)	Germany (München)	110 kV Distribution - Net	1260 MW 110 kV 380 km (100 single connections)	480 Mvar (7 units in the range 40..80 Mvar) 3,5 M€ (Price of new units)
43	Alain Gille (BEL Engineering)	Belgium (Brussels)	150 kV Tihange - Avernas Line	285 MVA / link 150 kV 2 x 30 km	No compensation
44	Michael Papadopoulos (Consultant) Anthony Kinrade (Manx Electricity)	United Kingdom	132 kV Isle of Man / Scotland Connection MVA 132 kV km	Information expected

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Answers to the questionnaire (page 11/13)

Answer N°	Expert (Company)	Country of the link	System	Power Voltage Length	Compensation
45	Michael Roth (GEW Rheinenergie AG) D. Rittinghaus (energycableconsult)	Germany (Cologne)	110 kV Distribution Network	5000 MVA 110 kV 380 km (50 separate links)	3x40 MVAR; 1x30 MVAR(Three phase) Each reactor about 20 m ² Cost : 500 k€/ unit
46	Marcos Lapenda (CHESF)	Brasil (Recife)	CHESF 230kV	-	No link > 10 km Project of 230 kV link in Fortaleza
47	Philippe Tecles (Nexans France)	France 1992	RTE Escaillon Tesse	.... MVA 63 kV 37,997 km / 3	No compensation
48	Philippe Tecles (Nexans France)	France 1995	RTE Kembs Rosenau 1	....MVA 90 kV 29,989 km / 3	No compensation
49	Philippe Tecles (Nexans France)	France 1999	RTE Etables Florac MVA 90 kV 29,365 km / 3	No compensation

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Answers to the questionnaire (page 12/13)

Answer N°	Expert (Company)	Country of the link	System	Power Voltage Length	Compensation
50	Philippe Tecles (Nexans France)	France 1999	RTE St Rémy des Landes	.... MVA 90 kV 31,449 km / 3	No compensation
51	Philippe Tecles (Nexans France)	France 2003	RTE Le Port St Paul La Réunion	.... MVA 90 kV 36,729 km / 3	No compensation
52		Great Britain (2005)	NGC Elstree London	1600 MVA 400 kV 20 km	Information expected
53	Jawdat Mansour (Pirelli France)	Tunisia (2005)	STEG Rades II Grombalia 1 & 2	2 x 250 MVA (2 circuits) 225 kV 25 km	Information expected

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Answers to the questionnaire (page 13/13)

Answer N°	Expert (Company)	Country of the link	System	Power Voltage Length	Compensation
54	Jawdat Mansour (Pirelli France)	Spain (2004)	Red Eletrica Aéroport de Barajas	2 x 1750 MVA Hiver (2 circuits) 400 kV 12,1 km	Information expected