

Cabos 11



70 Years of MV cables in Brazil

Reliability of:
Cables; Splices and Potheads

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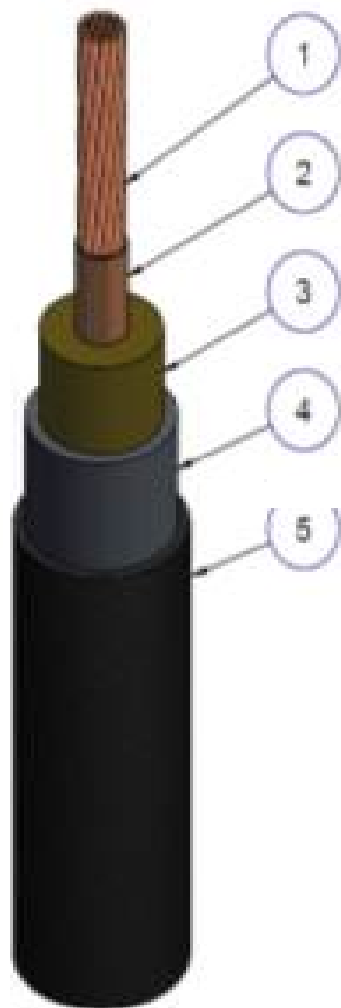
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1. CONDUCTOR - 19 WIRES
2. INTERNAL SEMICONDUCTOR – ALUMINIUM PAPER (thickness= 0,1 mm)
3. INSULATION – NATURAL CELUSOSIS PAPER
4. LEAD SHEATH – Pb
5. PE COVERED



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Jacket

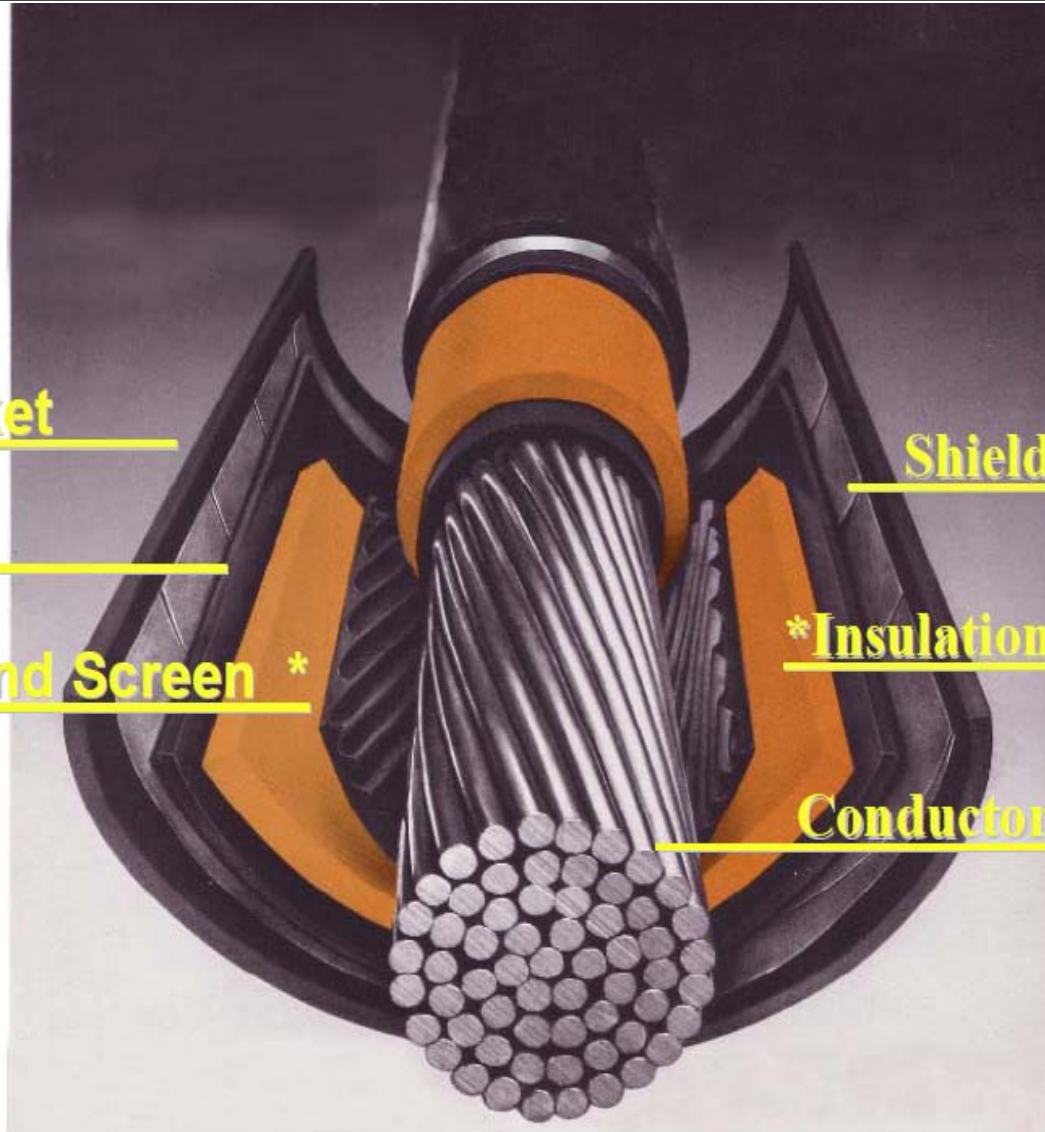
SC*

Strand Screen *

Shield

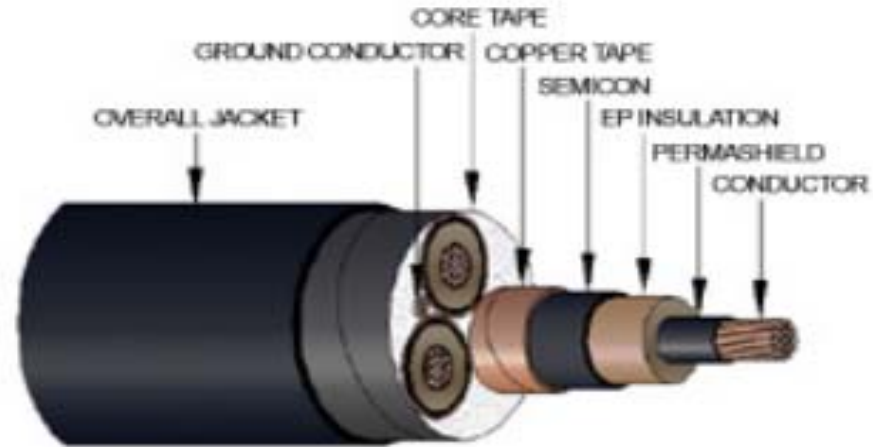
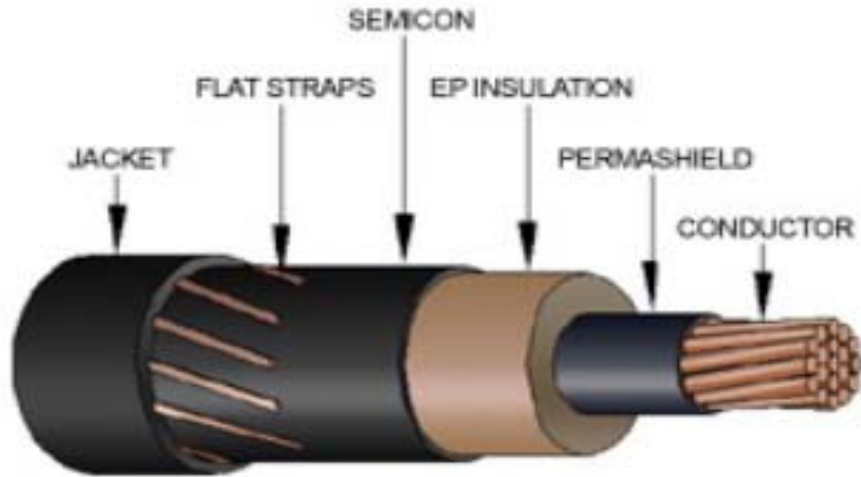
*Insulation

Conductor





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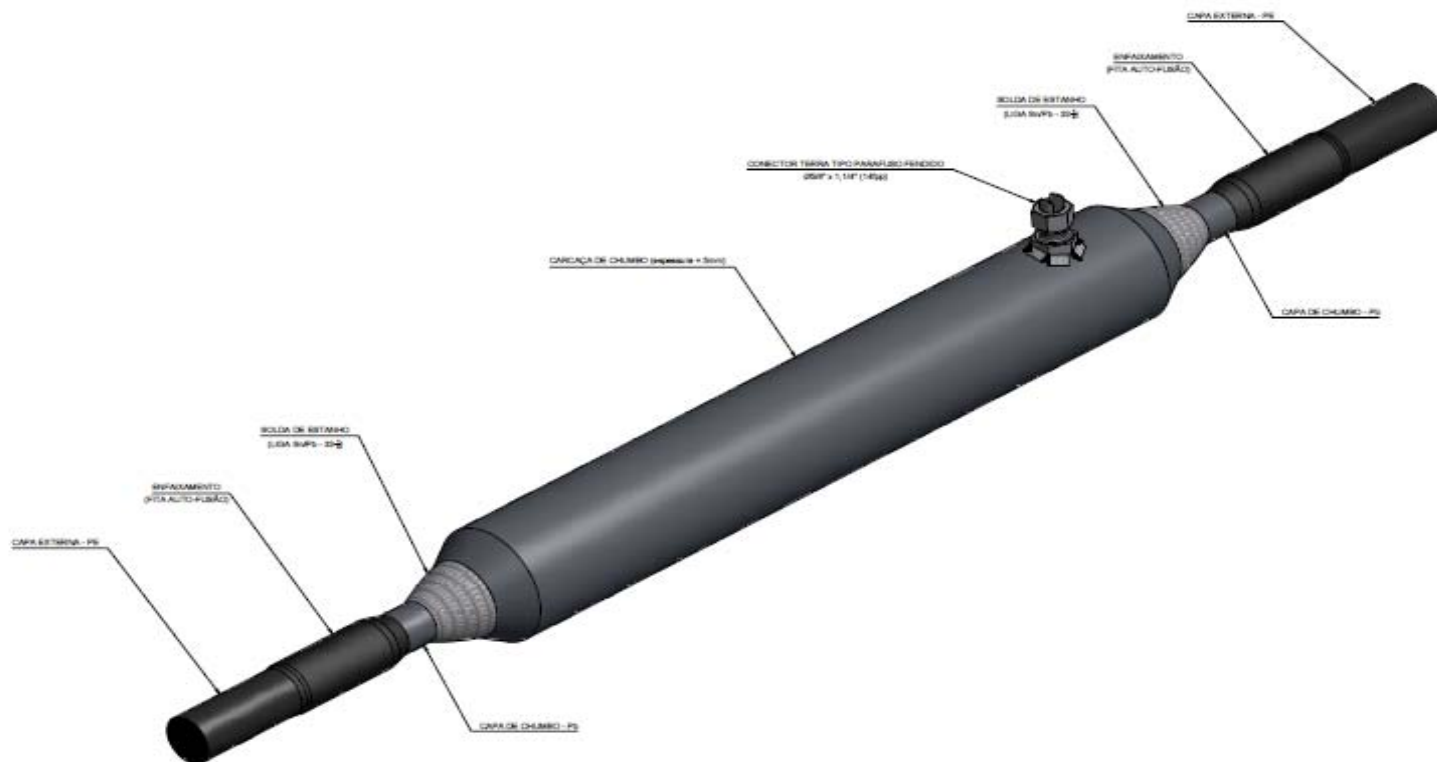
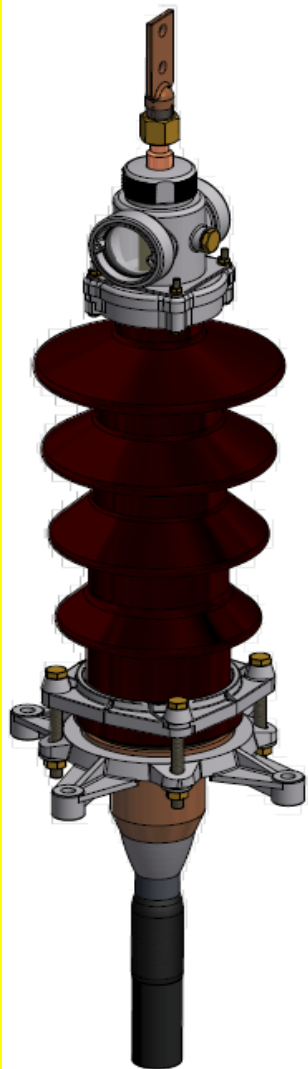


Cabos'11



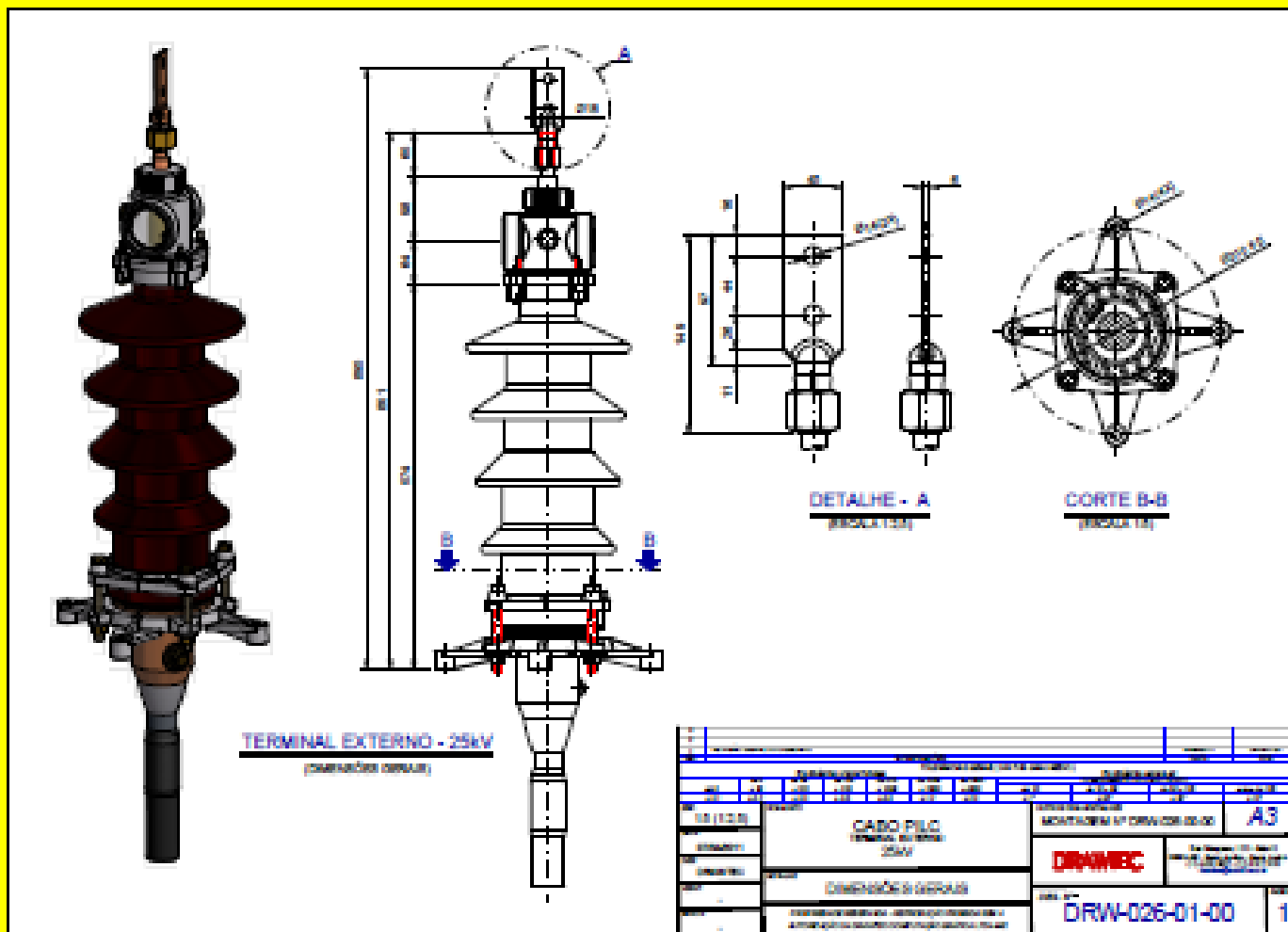
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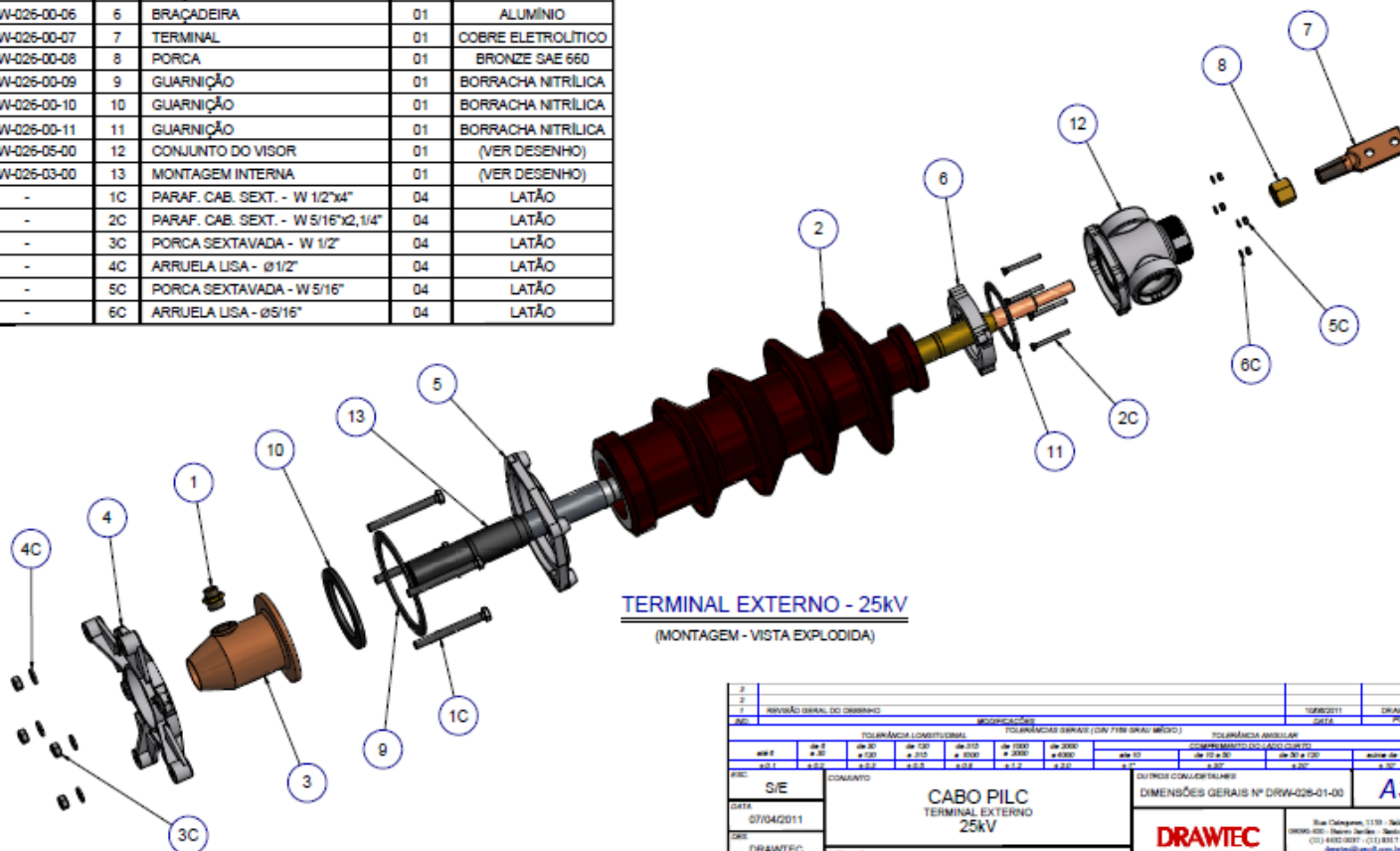
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Nº DO DESENHO	POS.	DENOMINAÇÃO	QUANT.	MATERIAL
DRW-026-00-01	1	NIPLÉ DE REDUÇÃO	01	BRONZE SAE 660
DRW-026-00-02	2	ISOLADOR	01	PORCELANA
DRW-026-00-03	3	CONE	01	COBRE ESTANHADO
DRW-026-00-04	4	BASE	01	ALUMÍNIO
DRW-026-00-05	5	BRAÇADEIRA	01	ALUMÍNIO
DRW-026-00-06	6	BRAÇADEIRA	01	ALUMÍNIO
DRW-026-00-07	7	TERMINAL	01	COBRE ELETROLÍTICO
DRW-026-00-08	8	PORCA	01	BRONZE SAE 660
DRW-026-00-09	9	GUARNIÇÃO	01	BORRACHA NITRILICA
DRW-026-00-10	10	GUARNIÇÃO	01	BORRACHA NITRILICA
DRW-026-00-11	11	GUARNIÇÃO	01	BORRACHA NITRILICA
DRW-026-05-00	12	CONJUNTO DO VISOR	01	(VER DESENHO)
DRW-026-03-00	13	MONTAGEM INTERNA	01	(VER DESENHO)
-	1C	PARAF. CAB. SEXT. - W 1/2"x4"	04	LATÃO
-	2C	PARAF. CAB. SEXT. - W 5/16"x2,1/4"	04	LATÃO
-	3C	PORCA SEXTAVADA - W 1/2"	04	LATÃO
-	4C	ARRUELA USA - Ø1/2"	04	LATÃO
-	5C	PORCA SEXTAVADA - W 5/16"	04	LATÃO
-	6C	ARRUELA USA - Ø5/16"	04	LATÃO



TERMINAL EXTERNO - 25kV

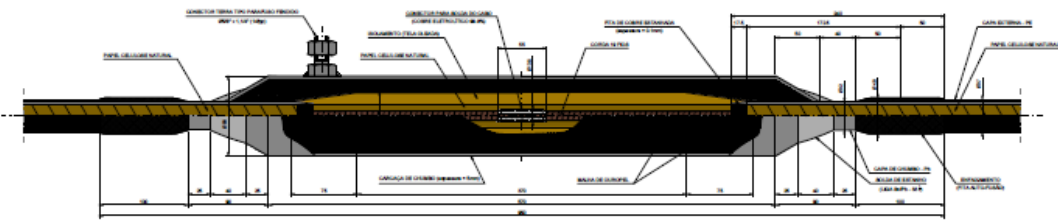
(MONTAGEM - VISTA EXPLODIDA)

TOLERÂNCIAS LINEARES		TOLERÂNCIAS ANGULARES	
de 0 a 30	de 30 a 120	de 0 a 30	de 30 a 120
±0,1	±0,2	±0,1	±0,2
±0,2	±0,3	±0,2	±0,3
±0,3	±0,4	±0,3	±0,4
±0,4	±0,5	±0,4	±0,5

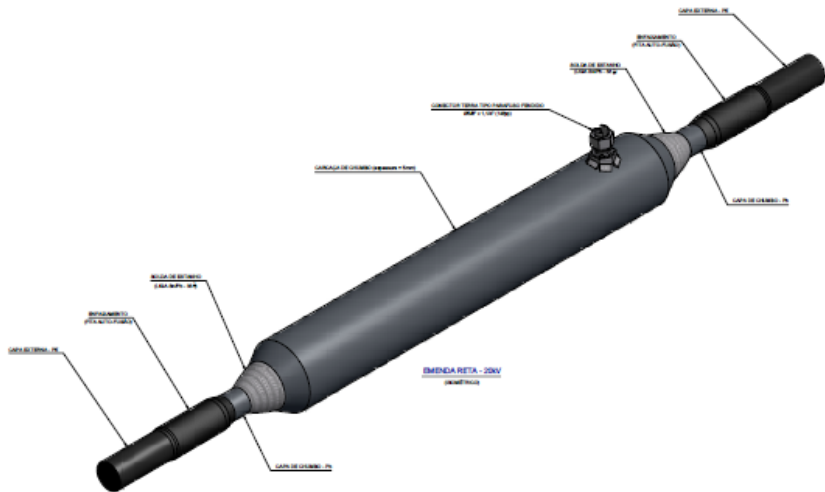
PROJ.	S/E	CONJUNTO	CABO PILC TERMINAL EXTERNO 25kV	DIMENSÕES GERAIS Nº DRW-026-01-00	A3
DATA	07/04/2011			DRAWTEC	Rua Domingos, 1139 - Sala 42 88040-000 - Bairro Indústrias - Santa Catarina - BR (011) 4882-0001 - (011) 4881-1000 drawtec@unib.com.br
EMP.	DRAWTEC	TÍTULO	MONTAGEM	DES. Nº	DRW-026-00-00
PROJ.			PROPRIEDADE RESERVADA - REPRODUÇÃO PROIBIDA SEM A AUTORIZAÇÃO DA DRAWTEC COMPUTAÇÃO GRÁFICA LTDA-ME	INSCRIÇÃO	1



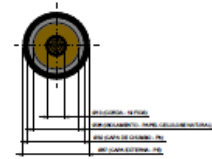
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EMENDA RETA - 20kV
SINTÉTICA



EMENDA RETA - 20kV
SINTÉTICA



DETALHE DO CABO
SINTÉTICO

NOTAS:

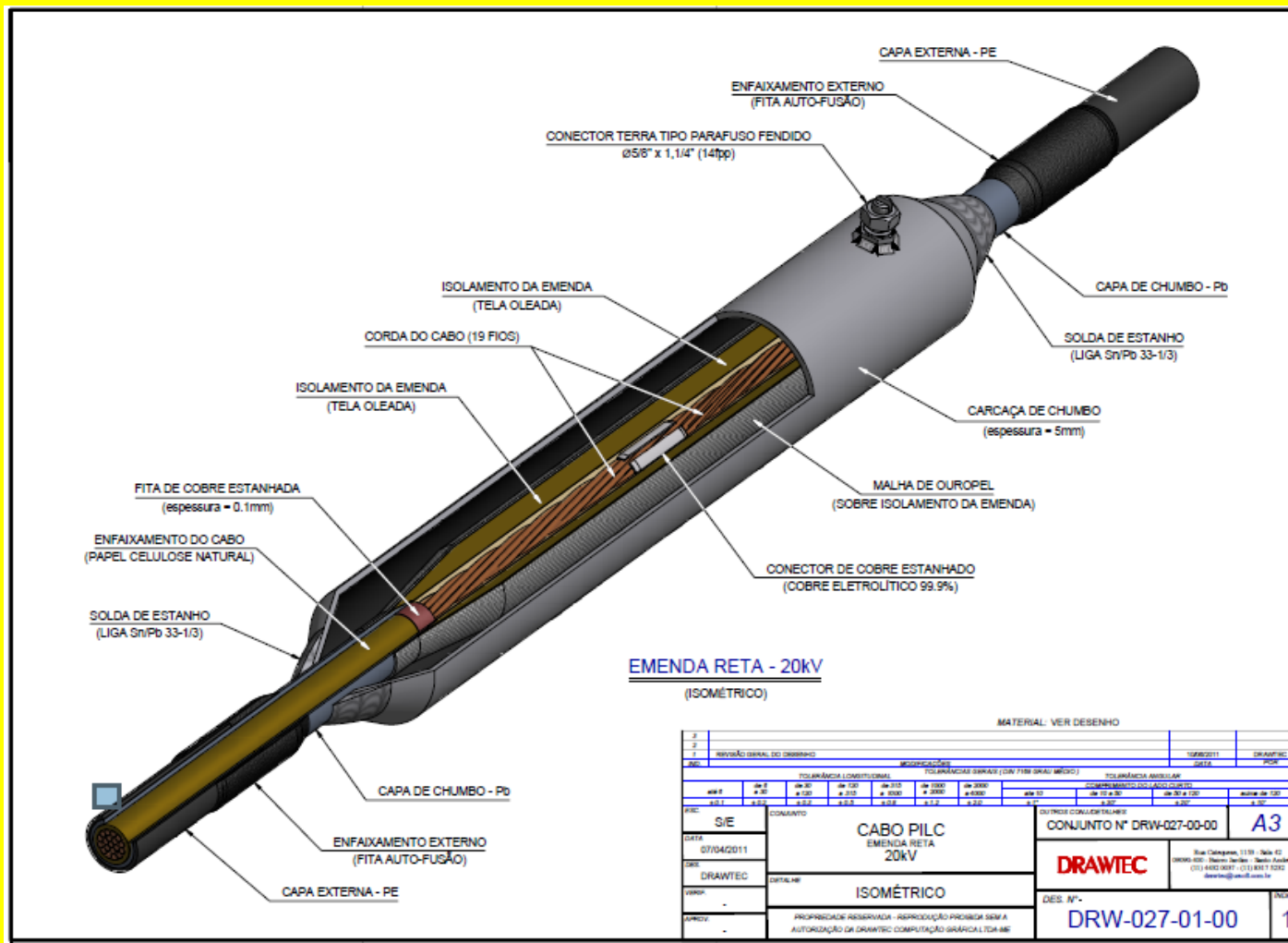
1. QUANTIDADE DE CABOS DE ALIAMENTO
2. CONDIÇÕES DE APLICAÇÃO DO MATERIAL
3. ABASTECIMENTO DE MATERIAIS

LEGENDA:

1	CABO PILC	AT
2	20kV	

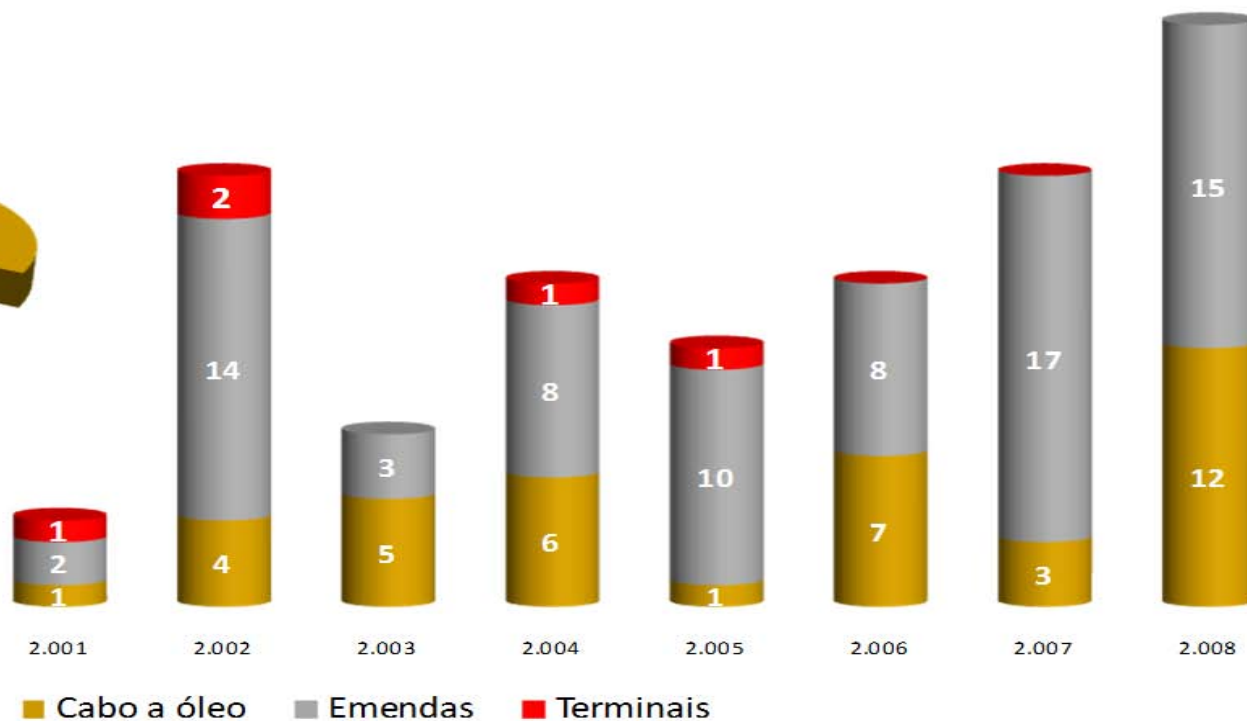
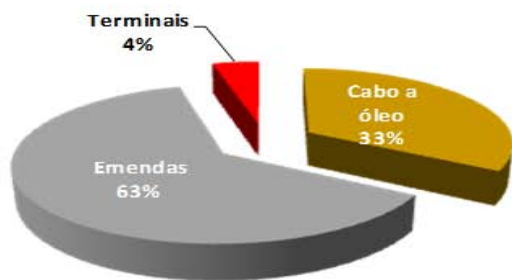


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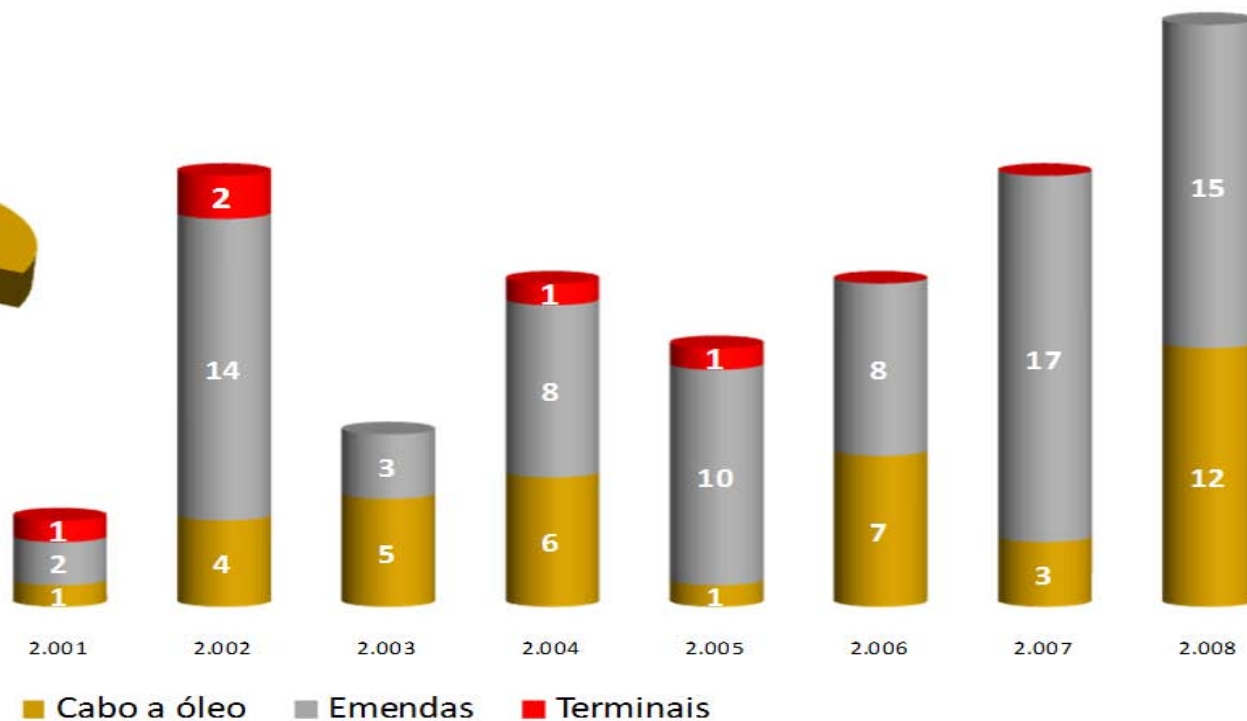
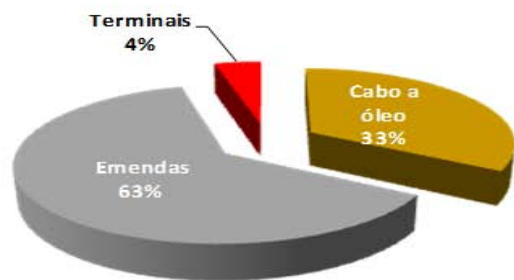


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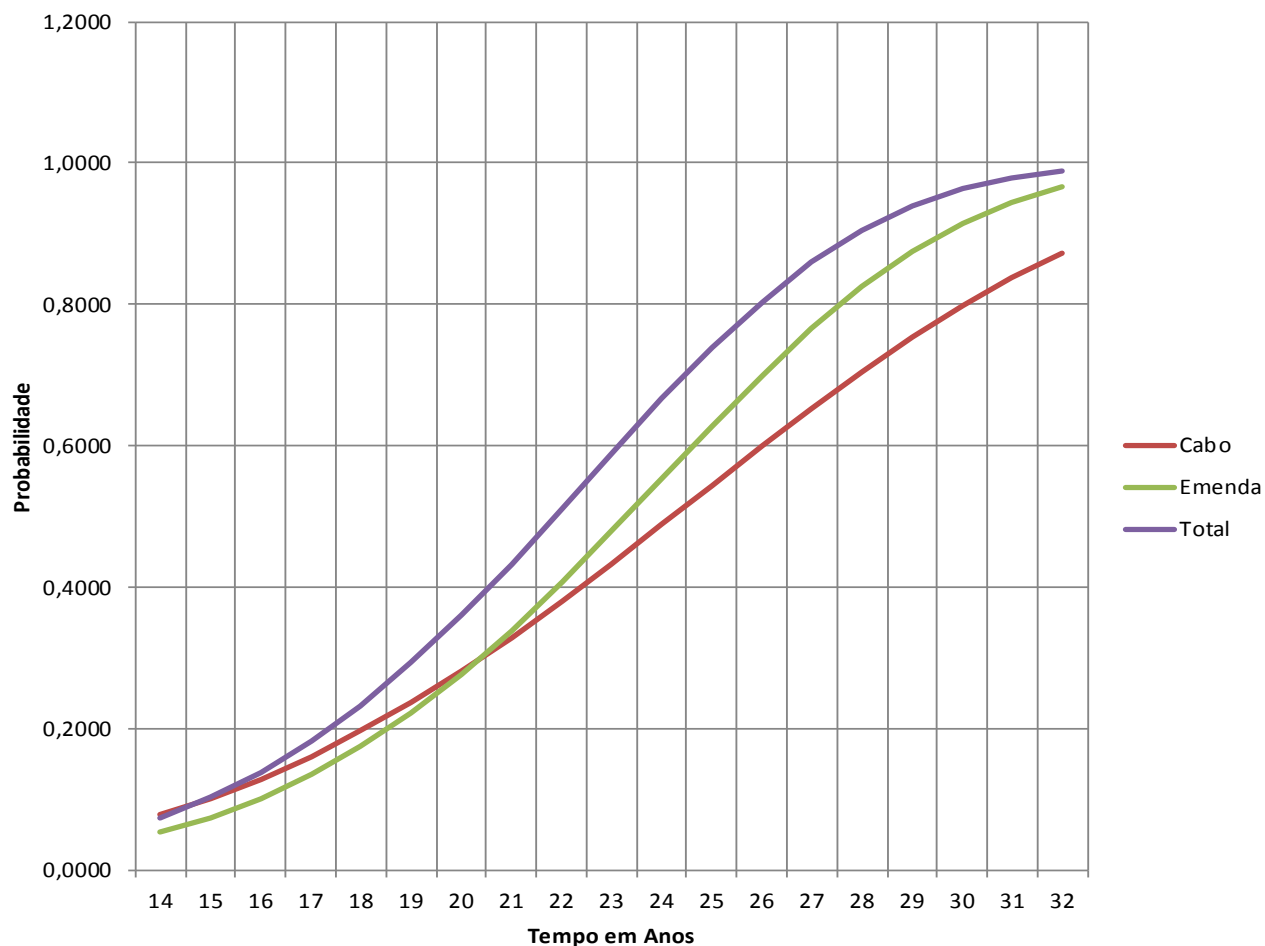


Cabos 11



t	F(t)=1-e^-((t-γ)/η)^β)		
	Cabo	Emenda	Total
14	0,0791	0,0535	0,0739
15	0,1022	0,0746	0,1023
16	0,1293	0,1014	0,1379
17	0,1608	0,1347	0,1814
18	0,1966	0,1749	0,2331
19	0,2368	0,2226	0,2928
20	0,2809	0,2776	0,3600
21	0,3288	0,3395	0,4332
22	0,3798	0,4072	0,5105
23	0,4333	0,4793	0,5892
24	0,4883	0,5538	0,6663
25	0,5440	0,6281	0,7388
26	0,5994	0,6996	0,8039
27	0,6533	0,7658	0,8595
28	0,7048	0,8245	0,9045
29	0,7530	0,8741	0,9387
30	0,7972	0,9141	0,9632
31	0,8368	0,9444	0,9794
32	0,8714	0,9661	0,9893

Defeitos em Cabos PILC - Weibull 2P





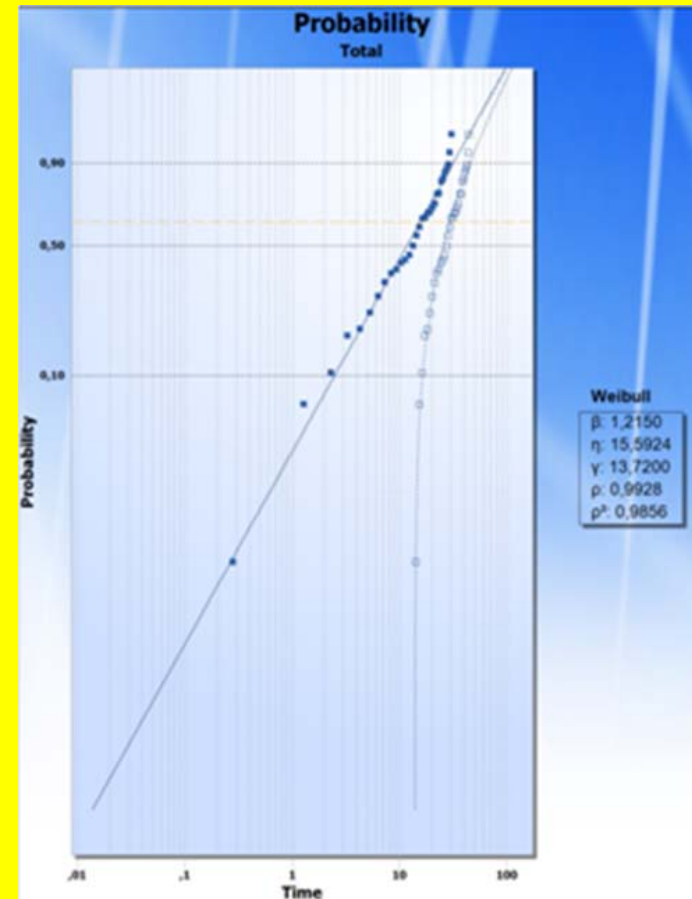
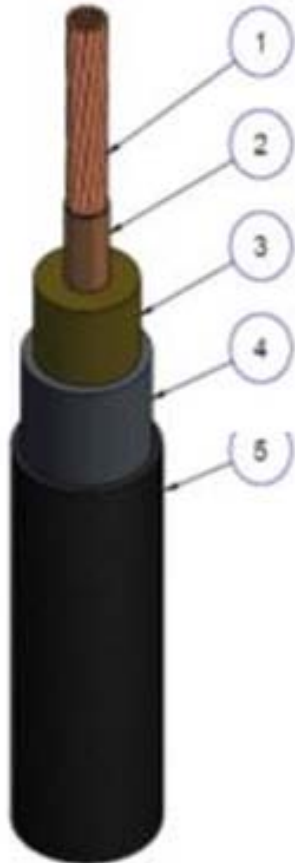
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$$F(t|0, \tau, \alpha) = 1 - \text{Exp}[-(t - \tau/t|0)^{\alpha}]$$

MTTF \geq 32 YEARS

THRESHOLD VALUE \geq 12.5 YEARS



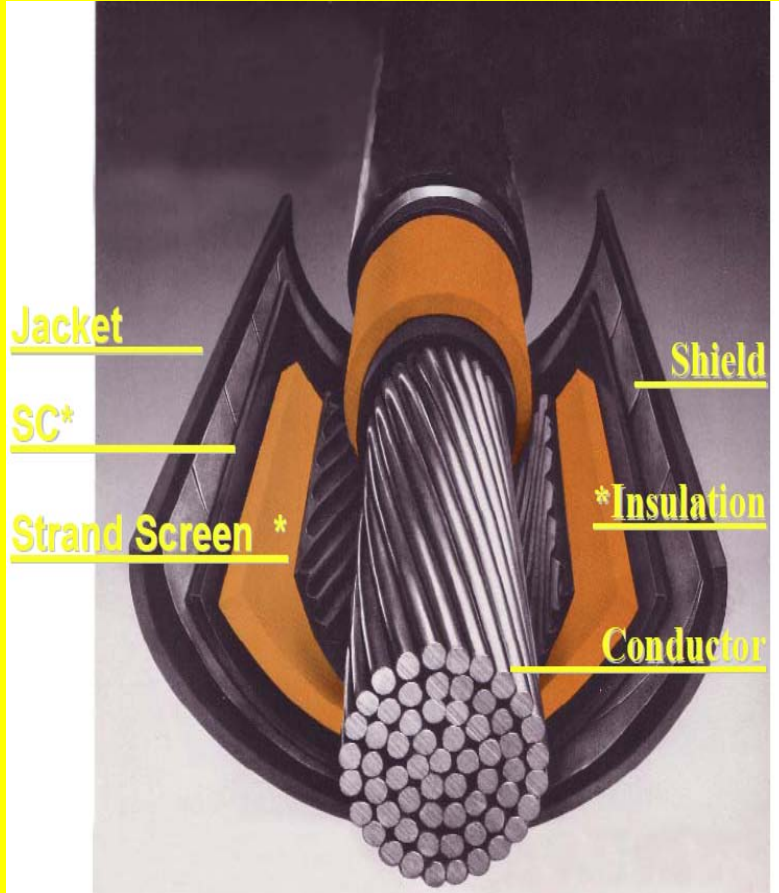
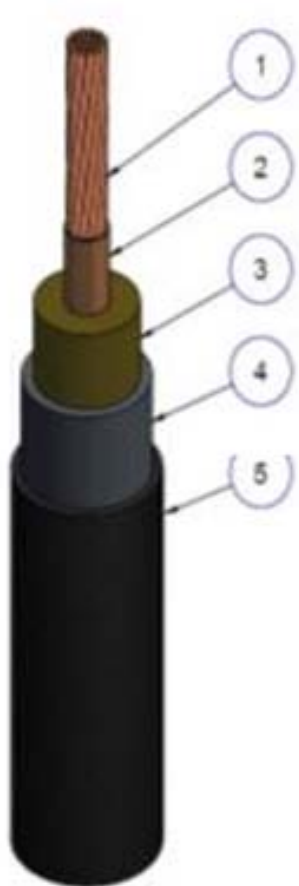


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MTTF \geq 32 YEARS

MTTF \geq 17 YEARS



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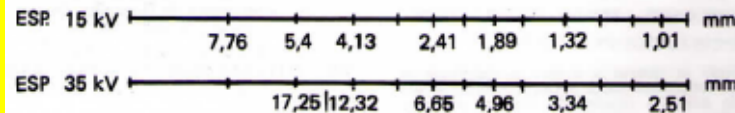
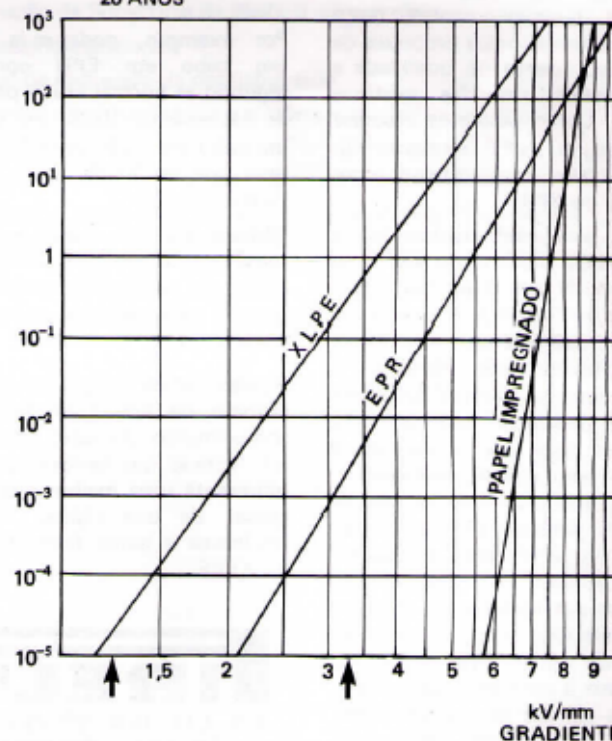


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Influência dos cabos e acessórios na confiabilidade dos sistemas de distribuição

NÚMERO DE FALHAS x GRADIENTE
500 MCM
50 km

Nº DE FALHAS
20 ANOS



MTTF(PILC) ≥ 32

MTTF(EPDM) ≥ 17

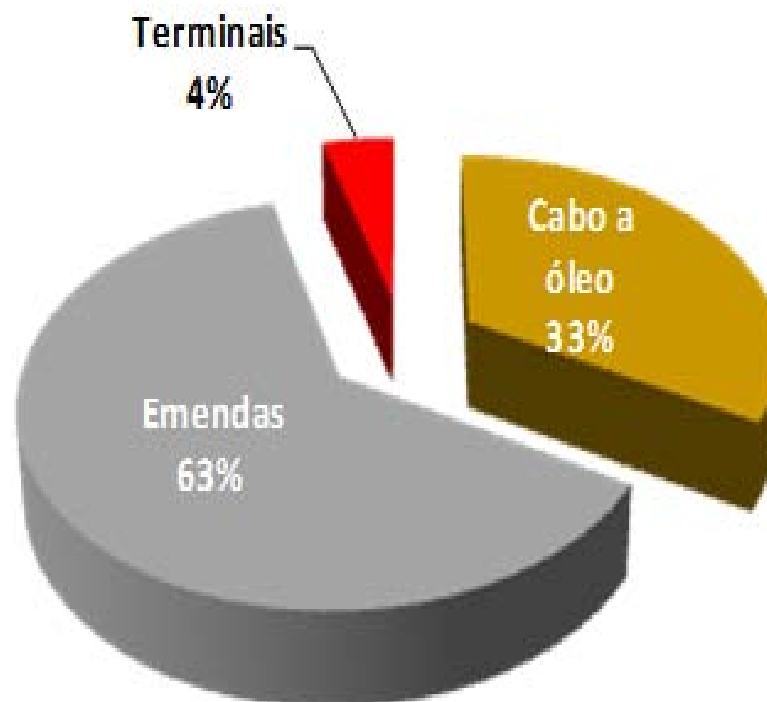
MTTF(XLPE) ≥ 15

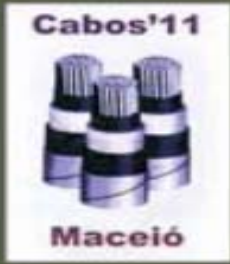
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CONCLUSIONS

Based in this preliminary analysis we are recommending:

- 1-To keep in service all PILC cables in network of São Paulo City.
- 2-To improve the design of the hybrid splices
- 3-To install over Downtown network a real time system of the partial discharge detection over PILC cables area.



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THANK YOU !