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VERRIGTINGE 1972

Deel 2

Tegniese Vergadering

25 en 26 MEI, 1972

Kempton Park

Die Vereniging van Munisipale Elektrisiteits-
ondernemings van Suid-Afrika



PROCEEDINGS 1972

Volume 2

Technical Meeting

25th and 26th MAY, 1972

Kempton Park

The Association of Municipal Electricity
Undertakings of South Africa



TECHNICAL MEETING 1972

TEGNIËSE VERGADERING 1972

HOLIDAY INN, JAN SMUTS, KEMPTON PARK

HOLIDAY INN, JAN SMUTS, KEMPTON PARK

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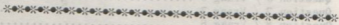
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1919-20	B. Sankey (Port Elizabeth) *	E. Poole *
1920-22	T.C.W. Dodd (Pretoria) *	L.L. Horrell *
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1935-36	G.G. Ewer (Pietermaritzburg) *	E. Poole *
1936-37	A. Rodwell (Johannesburg) *	E. Poole *
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1938-39	H.A. Eastman (Cape Town)	E. Poole *
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1944-45	A. Rodwell (Johannesburg) *	L.L. Horrell, 1/1/41 *
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	J.W. Phillips (Bulawayo) *	L.L. Horrell to 30/11/45 *
1946-47	G.J. Muller (Bloemfontein)	A.T. Taylor, 31/12/45 *
1947-48	C. Kinsman (Durban)	A.T. Taylor *
1948-49	A. Foden (East London)	A.T. Taylor *
1949-50	D.A. Bradley (Port Elizabeth)	A.T. Taylor *
1950-51	C.R. Hallé (Pietermaritzburg)	A.T. Taylor *
1951-52	J.C. Downey (Springs)	A.T. Taylor *
1952-53	A.R. Sibson (Salisbury)	A.T. Taylor *
1953-54	J.C. Fraser (Johannesburg) *	A.T. Taylor *
1954-55	G.J. Muller (Bloemfontein)	A.T. Taylor *
1955-56	D.J. Hugo (Pretoria)	A.T. Taylor to 30/6/55 *
1956-57	J.E. Mitchell (Salisbury)	Arthur Tingey, Ewing & Co. 1/7/55
1957-58	J.L. van der Walt (Krugers- dorp)	Davidson & Ewing (Pty) Ltd. 1/7/56
1958-59	G.C. Downie (Cape Town)	Davidson & Ewing (Pty) Ltd.
1959-60	R.W. Kane (Johannesburg)	Davidson & Ewing (Pty) Ltd.
1960-61	R.M.O. Simpson (Durban)	Davidson & Ewing (Pty) Ltd.
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1962-63	P.A. Giles (East London)	Davidson & Ewing (Pty) Ltd.
1963-64	J.C. Downey (Springs)	Davidson & Ewing (Pty) Ltd.
1964-65	R.W. Barton (Welkom)	Davidson & Ewing (Pty) Ltd.
1965-67	D. Murray-Nobbs	Davidson & Ewing (Pty) Ltd.
1967-69	G.C. Theron	Davidson & Ewing (Pty) Ltd.
1969-71	H.T. Turner	Davidson & Ewing (Pty) Ltd.
1971-73	J.K. von Ahlften	Davidson & Ewing (Pty) Ltd.

* Deceased / Oorlede

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Honorary Members/Ere-Lede:

- 1967 Beesley, R.W. Box/Bus 65, Lusaka, Zambia.
- 1949 Bradley, D.A. 9 Target Kloof Rd., P.E. *
- 1960 Castelyn, F.J.C. la Arbo- retum Ave., Bloemfon.
- 1963 (1944) Downey, J.C. 10 Jessop Rd., Selection Park, Springs. *
- 1963 (1947) Downie, C.G. 25 Rectory Gardens, Broadwater, Worthing, Sussex.*
- 1951 (1922) Eastman, H.A. Torwood, Parel Vallei, Somerset West.*
- 1948 (1938) Foden, A. 4 Hardy Road * Selborne, East London
- 1971 Frantz, A.C.T. 7 New Way Pinelands, Cape Town.
- 1969 (1939) Giles, P.A. Box/Bus 384, Pretoria *
- 1958 (1944) Hallé, C.R. 22 Connaught Rd. Pietermaritzburg *
- 1949 (1938) Hugo, D. 252 Olivier St., Brooklyn, Pretoria *
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- 1964 (1946) Kane, R.W. 208 Glen * Manor, Northfields Ave. Glenhazel, Johannesburg
- 1954 (1938) Kinsman, C. 7 Highgate Pl., Durban North *

* Past President

Council Members/Raadslede:

- 1962 (1935) Adelaide, Box/Bus 38.
- 1948 (1934) Alberton, Box/Bus 4.
- 1946 (1917) Aliwal North, Box/Bus 46.
- 1948 Barberton, Box/Bus 33.
- 1935 (1926) Beaufort West, Box/Bus 9.
- 1961 Bedfordview, Box/Bus 3.
- 1935 (1917) Benoni, Box/Bus 45.
- 1950 (1919) Bethal, Box/Bus 3.
- 1944 (1915) Bethlehem, Box/Bus 130.
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- 1964 Bloemhof, Box/Bus 18.
- 1936 (1915) Boksburg, Box/Bus 215.
- 1948 Brakpan, Box/Bus 15.
- 1966 Bredasdorp Box/Bus 51.
- 1948 Brits, Box/Bus 106.
- 1949 Bothaville, Box/Bus 12.
- Burgersdorp, Box/Bus 106.

- 1971 Lategan, J.F. 12 van der Stel St., Stellenbosch
- 1971 Leishman, R. Box/Bus 699, Johannesburg.
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- 1962 (1948) Mitchell, J.E. 1301 Gro- venor Crt., Snell Parade, Durban. *
- 1964 (1934) Muller, G.J. 35 Wil- cocks Rd, Bloemfon.*
- 1969 (1955) Murray-Nobbs, D. 4 Ascot Rd., Kemsley Park, Port Elizabeth *
- 1971 Rossler, W. 109 Amersham St. Lynwood Manor, Pret.
- 1962 (1935) Sibson, A.R. Box/Bus 9474, Hillside, Rhodesia. *
- 1971 Simpson, R.M.O. c/o Ovr, Arup & Prts, Box/Box 1348 Durban.
- 1968 (1937) Smith, E.L. 1 Ropley, Ross St., Amanzimtoti.
- 1971 Stevens, F. Elec. Dept., Box/Bus 29, Ladysmith.
- 1967 Telles, J. Box/Bus 1861, Lorenzo Marques.
- 1931 Turner, E.L. 6 Wurambi Drive, Umtali *
- 1962 (1949) van der Walt, J.L. Box/* Bus 1091, Johannesburg

* Pitgetrede President

- 1935 (1915) Cape Town, Box/Bus 298,
- 1960 Cartersville, Box Bus 5
- 1964 Carolina, Box/Bus 24.
- 1949 Ceres, Box/Bus 44.
- 1935 (1916) Cradock, Box/Bus 24.
- 1953 (1933) De Aar, Box/Bus 42.
- 1970 Delmas, Box/Bus 6.
- 1953 Dewetsdorp, Box/Bus 13.
- 1962 Dundee, Box/Bus 76.
- 1935 (1915) Durban, Box/Bus 147.
- 1935 (1919) East London, Box/Bus 134
- 1948 Edenvale, Box/Bus 25.
- 1957 Empangeni, Box/Bus 2.
- 1967 (1916) Ermelo, Box/Bus 48.
- 1935 Eshowe, Box/Bus 37.
- 1952 Estcourt, Box/Bus 15.
- 1935 (1927) Fort Beaufort, Box/Bus 36

- 1936 (1922) George, Box/Bus 19.
 1952 Germiston, Box/Bus 145
 1970 Glencoe, Box/Bus 10.
 1964 Gobabis, Box/Bus 33.
 1969 Gordon's Bay, Box/Bus 3.
 1969 (1934) Graaff-Reinet, Box/Bus 71.
 1936 (1924) Grahamstown, Box/Bus 170.
 1947 (1915) Greyton, Box/Bus 71.
 1949 Heidelberg, Box/Bus 201.
 1972 Hennenman, Box/Bus 29.
 1959 Hermanus, Box/Bus 20.
 1968 Howick, Box/Bus 5.
 1935 (1915) Johannesburg, Box/Bus 1049
 1965 Kakamas, Box/Bus 174.
 1964 Keetmanshoop, Box/Bus 25.
 1952 Kempton Park, Box/Bus 13.
 1954 Kenhardt, Box/Bus 15.
 1935 (1917) Kimberley, Box/Bus 194.
 1971 King William's Town, Box/Bus 33.
 1935 (1916) Klerksdorp, Box/Bus 160.
 1960 Knysna, Box/Bus 21.
 1935 (1934) Kokstad, Box/Bus 8.
 1951 Komga, Box/Bus 21.
 1965 Koppies, Box/Bus 14.
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 1935 (1915) Ladysmith, Box/Bus 29.
 1970 Lichtenburg, Box/Bus 7.
 1945 Louis Trichardt, Box/Bus 96
 1959 Lydenburg, Box/Bus 61.
 1935 (1926) Mafeking, Box/Bus 42.
 1935 Matatiele, Box/Bus 35.
 1965 Messina, Box/Bus 44.
 1964 Meyerton, Box/Bus 9.
 1939 (1929) Middelburg, CP Box/Bus 55.
 1935 (1926) Middelburg, Tvl. " 14.
 1954 (1929) Mossel Bay, Box/Bus 25.
 1945 Nelspruit, Box/Bus 45.
 1948 (1915) Newcastle, Box/Bus 21.
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 1948 Odendaalsrus, Box/Bus 21.
 1959 Orkney, Box/Bus 34.
 1944 (1915) Oudtshoorn, Box/Bus 225.
 1935 (1926) Paarl, Box/Bus 12.
 1951 Parys, Box/Bus 39.
 1959 Peri-Urban Areas Health Board, Box/Bus 1341, Pretoria
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 1935 (1920) Pietersburg, Box/Bus 111.
 1935 (1915) Pietermaritzburg, Box/Bus 321
 1936 Piet Retief, Box/Bus 23.
 1936 (1934) Port Alfred, Box/Bus 13.
 1935 (1915) Port Elizabeth, Box/Bus 116.
 1936 Port Shepstone, Box/Bus 5
 1953 Postmasburg, Box/Bus 5.
 1948 (1915) Potchefstroom, Box/Bus 113
 1944 Potgietersrust, Box/Bus 34
 1935 (1915) Pretoria, Box/Bus 440
 1935 (1915) Queenstown, Box/Bus 113.
 1935 (1929) Randfontein, Box/Bus 139
 1956 Riversdale, Box/Bus 29.
 1935 (1929) Robertson, Box/Bus 52.
 1935 (1926) Roodepoort-Maraaisburg, Box/Bus 217, Roodepoort.
 1944 (1920) Rustenburg, Box/Bus 16.
 1965 Saldanha, Box/Bus 22.
 1956 Sasolburg, Box/Bus 60.
 1935 (1916) Somerset East, Box/Bus 21
 1948 (1927) Somerset West, Box/Bus 19
 1935 (1916) Springs, Box/Bus 45.
 1935 (1915) Standerton, Box/Bus 66.
 Stanger, Box/Bus 72.
 1938 (1916) Stellenbosch, Box/Bus 17
 1959 Stilfontein, Box/Bus 20
 1949 Strand, Box/Bus 3.
 1959 (1927) Tarkstad, Box/Bus 21.
 1963 Thabazimbi, Box/Bus 90
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 1936 (1927) Umtata, Box/Bus 57.
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 1955 Virginia, Box/Bus 156.
 1971 Volksrus, Box/Bus 48.
 1947 (1929) Vrede, Box/Bus 155.
 1935 Vryburg, Box/Bus 35.
 1948 (1920) Vryheid, Box/Bus 57.
 1960 Walvis Bay, Box/Bus 2.
 1955 Warmbaths, Box/Bus 48.
 1953 Welkom, Box/Bus 708.
 1956 Wellington, Box/Bus 12.
 1953 Westonaria, Box/Bus 19.
 1960 White River, Box/Bus 2.
 1946 Willowmore, Box/Bus 15.
 1944 (1919) Winburg, Box/Bus 26.
 1945 (1924) Windhoek, Box/Bus 59.
 1955 (1927) Witbank, Box/Bus 3.
 1964 Wolmaransstad, Box/Bus 17
 1936 (1922) Worcester, Box/Bus 37.

Dates in brackets initial membership as or by Engineer. Membership not necessarily continuous.

Datums in hakkies verteenwoordig eerste lidmaatskap as of deur bemiddeling van Ingenieur. Lidmaatskap nie noodwendig aaneenlopend nie.

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- 1946 Andrew, W.N. 7 Tainton Avenue,
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1944 Burton, C.R. 54 Memorial Road,
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Campbell, A.R. Box/Bus 3,
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Clinton, J.S. Box/Bus 4648,
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1934 Dawson, C. Electricity Supply
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1957 Dunstan, R.S. Box/Bus 5001,
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1950 Erikson, J.G.F. Box/Bus 24,
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1960 Ford, W.P. Box/Bus 423, Maseru.
1936 Heasman, G.G. Box/Bus 77, Fort
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- 1947 Aalbers, C. Municipal Elec-
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Engineer, Box/Bus 15,
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1970 Barnard, P.J. Electrical
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1959 Beard, G.R. Town Electrical
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- 1962 Liebenberg, S.J. Electrical and
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ment of Bantu Administration
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1953 Macques, J.A. Box/Bus 378,
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1961 Magowan, J.M. Rhodesia Elec-
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1946 Mole, E.W. Box/Bus 118,
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1947 Williams, J.T. Box/Bus 1617,
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1948 Woolridge, W.E.L. Box/Bus 24,
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1946 Wylie, R.J.S. Box/Bus 217,
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- 1969 Bernhardt, J.L. Borough and
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1971 Bobek, K.H. Borough Electri-
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1957 Booysens, L. Town Electrical
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trical Engineer, Box/Bus
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1972 Botha, N.S. Town Elec. Eng.
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- 1960 Bozyczko, W.B. Town Electrical Engineer, Box/Bus 15, Eastcourt
- 1970 Briers, D.B. Electrical Engineer, Box/Bus 302, Kroonstad.
- 1958 Brown, D.C. Electrical Engineer Box/Bus 25, Edenvale.
- 1970 Brummer, J.G. Electrical Engineer, Box/Bus 17, Stellenbosch
- 1969 Catchpole, T.D. Borough Engineer, Box/Bus 5, Howick.
- 1969 Chapel, M.J.W. City Electrical Engineer, Box/Bus 369, Port Elizabeth.
- 1948 Cherry, J.R. Municipal Electrical Engineer, Box/Bus 159, Randfontein.
- 1955 Clarke, M.P.P. Borough Electrical Engineer, Box/Bus 21, Newcastle.
- 1972 Collins, S.T. City Electrical Engineer, Box/Bus 121, Umtali.
- 1970 Cossar, C.L. Electrical Engineer, Box/Bus 581, Bulawayo.
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- 1955 de Villiers, E.E. Town Electrical Engineer, Box/Bus 16, Rustenburg.
- 1964 de Villiers, S. de V. Municipal Electrical Engineer, Box/Bus 44, Ceres.
- 1965 Dernier, W. Electrical Engineer, Box/Bus 206, Aliwal North.
- 1957 Dreyer, H.C. Electrical Engineer, Box/Bus 12, Paarl.
- 1950 Dreyer, L. Municipal Electrical Engineer, Box/Bus 19, Westonaria
- 1970 Forbes, G. Electrical Engineer, Box/Bus 628, Kimberley.
- 1966 Fortman, A.H.L. Town Electrical Engineer, Box/Bus 215, Boksburg.
- 1965 Fraser, D.H. City Electrical Engineer, Box/Bus 147, Durban.
- 1952 Fatcher, L. Municipal Electrical Engineer, Box/Bus 13, Kempton Pk.
- 1970 Gamble, J.S. Electrical Engineer, Box/Bus 255, Oudtshoorn.
- 1945 Gericke, J.M. Municipal Electrical Engineer, Box/Bus 99, Klerksdorp.
- 1953 Haig-Smith, D. Town Electrical Engineer, Box/Bus 113, Queenstown
- 1949 Halliday, K.W.J. Municipal Electrical Engineer, Box/Bus 5, Port Shepstone, Natal.
- 1972 Hammerschlag, S.N. Town Electrical Engineer, Box/Bus 3, Bedfordview.
- 1927 Harvey, A.Q. Town Electrical Engineer, Box/Bus 96, Louis Trichardt.
- 1953 Hatwich, A.T.J. Town and Electrical Engineer, Box/Bus 13, Dewetsdorp, Orange Free State.
- 1965 Heydenrych, J.E. Electrical Engineer, Box/Bus 14, Middelburg, Transvaal.
- 1970 Hess, I.H. City Electrical Engineer, Box/Bus 82, Cape Town
- 1956 Dawson, J.D. Town Electrical Engineer, Box/Bus 45, Uitenhage.
- 1944 Inglis, J.I. Town Electrical and Water Engineer, Box/Bus 111 Pietersburg.
1959. Koeslag, H.J. Electrical Engineer, Box/Bus 52, Robertson.
- 1949 Kruger, M.J.C. Municipal Electrical Engineer, Box/Bus 13, Port Alfred.
- 1971 Labuschagne, J.J. Town Electrical Engineer, Box/Bus 86, Walvis Bay, South West Africa.
- 1956 Lewis, L. Town Electrical Engineer, Box/Bus 59, Windhoek.
- 1959 Lochner, J. van S. Town Electrical Engineer, Box/Bus 106, Brits.
- 1949 Lombard, C. City Electrical Engineer, Box/Bus 145, Germiston.
- 1944 Lotter, G.A. Town Electrical Engineer, Box/Bus 54, Potgietersrust, Transvaal.
- 1970 Loubser, J.A. Electrical Engineer, Box/Bus 1014, Benoni.
- 1955 Lynch, E.C. City Electrical Engineer, Box/Bus 73, Salisbury
- 1954 McNeil, J.L. Town Electrical Engineer, Box/Bus 8, Kokstad.
- Maclachlan, A.C. Town Electrical Engineer, Box/Bus 22, Saldanha.
- 1945 Meintjies, P.A. Municipal Electrical Engineer, Box/Bus 16, Rustenburg, Transvaal.
- 1952 Millen, T.J. Town and Electrical Engineer, Box/Bus 24, Tzaneen, Transvaal.

- 1929 Moeke, T.M. Town and Electrical Engineer, Box/Bus 23, Piet Retief.
- 1969 Mostert, S.A. Electrical Engineer, Box/Bus 19, Goerge
- 1968 Murphy, K.J. Municipal Electrical Engineer, Box/Bus 24, Cradock.
- 1964 Odendaal, M.W. Town Electrical Engineer, Box/Bus 4, Alberton.
- 1957 Paull, R.A. Borough and Electrical Engineer, Box/Bus 2, Empangeni.
- 1963 Peters, A.G. Town Electrical Engineer, Box/Bus 278, Gwelo, Rhodesia.
- 1966 Pike, E.B. Town Electrical Engineer, Box/Bus 130, Bethlehem.
- 1969 Plowden, D.C. General Manager, Electricity Department, Box/Bus 699, Johannesburg.
- Potgieter, N.A. Electrical Engineer, Box/Bus 66, Standerton.
- 1951 Pretorius, D.R. Town Electrical Engineer, Box/Bus 39, Parys, Orange Free State.
- 1952 Pretorius, E. de C. Electrical Engineer, Box/Bus 113, Potchefstroom, Transvaal.
- 1960 Pretorius, J.W. Electrical Engineer, Box/Bus 23, Nigel, Transvaal.
- 1968 Psotta, K.U. Electrical Engineer, Box/Bus 25, Keetmanshoop.
- 1961 Rattey, W.P. Electrical Engineer, Box/Bus 3, Strand.
- 1948 Reyneke, G.M. Town Electrical Engineer, Box/Bus 26, Winburg.
- 1968 Robson, K.G. City Electrical Engineer, Box/Bus 529, East London.
- 1944 Rush, W. Borough Electrical Engineer, Box/Bus 76, Dundee.
- 1965 Strauss, J.C. Town Electrical Engineer, Box/Bus 60, Sasolburg.
- 1962 Te Brugge, E.J. Town Electrical Engineer, Box/Bus 42, Mafeking Cape Province.
- 1970 Ten Cate, J.I. Town Electrical Engineer, Box/Bus 7, Lichtenburg.
- 1946 Theron, G.C. Town Electrical Engineer, Box/Bus 3, Vanderbijlpark.
- 1945 Theron, W.C. Municipal Electrical Engineer, Box/Bus 37, Worcester, Cape Province.
- 1966 Trautman, E.P.E.W., Town Electrical Engineer, Box/Bus 29, Ladysmith.
- 1950 Turnbull, A.F. Town Electrical Engineer, Box/Bus 35, Vereeniging.
- 1964 Van den Berg, A.J. Town Electrical Engineer, Box/Bus 94, Krugersdorp, Transvaal.
- 1964 Van der Merwe, D.S. Electrical Engineer, Box/Bus 5, Witbank.
- 1955 Van der Merwe, F.J. Municipal Electrical Engineer, Box/Bus 3, Carletonville.
- 1957 Van Heerden, W.J. Electrical Engineer, Box/Bus 201, Heidelberg, Transvaal.
- 1956 Van Meerdervoort, J.K.L., Pompe, Town Electrical Engineer, Box 33, Barberton.
- 1965 Van Wyk, A.A. Town Electrical Engineer, Box/Bus 9, Meyerton, Transvaal.
- 1951 Verschoor, D.R. Town Electrical Engineer, Box/Bus 36, Fort Beaufort.
- 1957 Von Ahlfen, J.K. Town Electrical Engineer, Box/Bus 45, Springs, Transvaal.
- 1954 Waddy, J.C. City Electrical Engineer, Box/Bus 399, Pietermaritzburg.

Associates / Geassosieerdes:

- 1971 Adams, C.G. Deputy Electrical Engineer, Box/Bus 69, Port Elizabeth.
- 1971 Bamber, F.W. Deputy City Electrical Engineer, Box/Bus 1803, Bulawayo, Rhodesia.
- 1965 Barnard, W. Manager, Maintenance & Operating, Electricity Dept., Box/Bus 699, Johannesburg.
- 1960 Boshoff, J.J. Assistant Electrical Engineer, Box/Bus 3, Vanderbijlpark.

- 1968 Brink, H.J. Section Engineer, Generation, Box/Bus 288, Bloemfontein.
- 1968 De Vries, G.S. Section Engineer, Distribution, Box 288, Bloemfontein.
- 1971 Du Plessis, C.J. Deputy Town Electrical Engineer, Box/Bus 15, Brakpan.
- 1963 Du Plessis, G.C. Deputy Town Electrical Engineer, Box/Bus 113, Potchefstroom.
- 1963 Du Plooy, D.P. Electrical Engineer, Box/Bus 45, Nelspruit.
- 1968 Gerber, A. Assistant Electrical and Mechanical Engineer, Box/Bus 94, Krugersdorp
- 1970 Leigh, R.A. Assistant Manager Electricity Department, Box/Bus 699, Johannesburg.
- 1966 Louw, H.A.L. Assistant Electrical Engineer, Box/Bus 12, Paarl, Cape Province.
- 1948 McIntyre, H.A. Assistant Town Electrical Engineer, Box/Bus 35, Vereeniging.
- 1957 Rautenbach, G.F. Deputy Electrical Engineer, Box/Bus 99, Klerksdorp.
- 1968 Reichert, W.J. Assistant Electrical Engineer, Box/Bus 106, Brits.
- 1971 Scholes, E.H. Manager (Planning and Technical), Box/Bus 699, Johannesburg.
- 1956 Sulter, F.J. Assistant Electrical Engineer, Box/Bus 145, Grahamstown.
- 1962 Surtees, E.H. Assistant Electrical Engineer, Box/Bus 215, Boksburg.
- 1967 Van Skalkwyk, A.P. Deputy City Electrical Engineer, Box/Bus 288, Bloemfontein.
- 1971 Weyers, J.D. Assistant Town Electrical Engineer, Box/Bus 218, Randfontein.
- 1952 Williams, A.H. Assistant Electrical Engineer, Box/Bus 45, Springs.
- 1971 Wrigley, P. Deputy Electrical Engineer, Box/Bus 73, Salisbury, Rhodesia.

Associate Members / Verbonde Lede:

- 1971 Bosch, D.M. Town Electrical Engineer, Box/Bus 31, Tarkastad
- 1970 Buisset, J.A. Electrical Engineer, Box/Bus 34, Orkney.
- 1971 Claxton, H.D. Electrical Engineer, Box/Bus 71, Graaff-Reinet
- 1968 Dauth, W.J. Assistant Electrical Engineer, Box/Bus 48, Volksrust.
- 1965 De Bruyn, C.D. Town Electrical Engineer, Box/Bus 17, Willowmore, Cape Province.
- 1969 Goussard, P.J. Senior Electrician, Box/Bus 14, Koppies.
- 1971 Greyling, B.C.B. Electrical Engineer, Box/Bus 48, Ermelo.
- 1971 Grove, C.R. Senior Electrician, Box/Bus 43, Harrismith.
- 1966 Hugo, J.C. Electrical Engineer, Box/Bus 51, Bredasdorp.
- 1962 Huysamen, G.A. Electrical Engineer, Box/Bus 13, Victoria West.
- 1966 Jooste, P.M. Electrical Engineer, Box/Bus 44, Messina.
- 1972 Kobus, E.E. Senior Electrician, Box/Bus 5, Postmasburg.
- 1959 Laas, C.P. Electrical Engineer, Box/Bus 15, Kenhardt.
- 1956 McNamara, A.B. Electrical Engineer, Box/Bus 21, Komga, C.P.
- Munro, J.A. Town Electrical Engineer, Box/Bus 18, Bloemhof
- 1971 Nel, J.T.F. Town Electrical Engineer, Box/Bus 33, King William's Town.
- 1969 Nieuwenhuis, J.F. Electrical Engineer, Box/Bus 17, Wolmaranstad.
- 1969 Opperman, D.J. Deputy Electrical Engineer, Box/Bus 45, Springs
- 1970 Pagel, P.V.E. Electrical Engineer, Box/Bus 174, Kakamas.
- 1971 Peens, J.G. Town Electrical Engineer, Box/Bus 24, Carolina.
- 1969 Pieterse, A.C. Electrical Engineer, Box/Bus 64, Ladybrand.
- 1969 Pretorius, P.J.R. Town Electrical Engineer, Box/Bus 35, Vryburg.

- 1969 Pollock, T. Town Electrical Engineer, Box/Bus 3, Gordon's Bay.
- 1970 Small, C.T.R. Electrical Engineer, Box/Bus 29, Riversdale.
- 1970 Smith, F.H. Electrical Engineer, Box/Bus 42, Despatch.
- Affiliates / Geaffilieerdes:**
- 1959 AEG-Telefunken (Pty) Ltd., Box/Bus 10264, Johannesburg.
- 1957 Abedare Cables (Africa) Ltd., Box/Bus 494, Port Elizabeth.
- 1957 Adams, Ripley & Dürr, Box/Bus 31126, Braamfontein.
- 1957 African Cables Ltd., Box/Bus 172, Vereeniging.
- 1959 African Explosives & Chemical Industries Ltd., Box/Bus 1122, Johannesburg.
- 1957 Alcan Aluminium of S.A. Ltd., Box/Bus 2430, Johannesburg.
- 1957 Allenwest S.A. (Pty) Ltd., Box/Bus 6168, Johannesburg.
- 1972 Alucab (Pty) Ltd., Box/Bus 1742, Johannesburg.
- 1959 Asca Electric (Pty) Ltd., Box/Bus 691, Pretoria.
- 1970 Austevens Enterprises (Pty) Ltd., Box/Bus 172, Florida.
- 1957 Aycliffe Cables Ltd., Box/Bus 5244, Johannesburg.
- 1965 Ballenden & Robb, Box/Bus 4648, Johannesburg.
- 1957 Brian Colquhoun O'Donnell & Partners (Rhodesia), 10th Floor, Chester House, Speke Avenue, Salisbury, Rhodesia.
- 1959 British Insulated Callender's Cables S.A. Ltd., Box/Bus 2827, Johannesburg.
- 1957 Brown Boveri Orsal (Pty) Ltd., Box/Bus 10966, Johannesburg.
- 1936 W.R. Burnett (Pty) Ltd., Box/Bus 338, Johannesburg.
- 1957 C.M.B. Engineering Co. (Pty) Ltd., Box/Bus 25655, Denver, Johannesburg.
- 1970 Carst, Walker Chemicals (Pty) Ltd., Box/Bus 5500, Johannesburg.
- 1970 Chemilite (Pty) Ltd., Box/Bus 25720, Johannesburg.
- 1970 Swart, T.L. Electrical Engineer, Box/Bus 10, Glencoe.
- 1962 Van der Schyff, G.W. Town Electrical Engineer, Box/Bus 3, Bedfordview.
- 1971 Zwiigelaar, A.G. Chief Electrician, Box/Bus 90, Thabazimbi.
- 1957 Chloride Electrical Storage Co. S.A. (Pty) Ltd., Box/Bus 39364, Bramley, Transvaal.
- 1964 Clinkscales, Maughan-Brown & Partners, Box/Bus 196, Port Elizabeth.
- 1972 Conradie, D.J.J. & Partners, Box/Bus 17031, Groenkloof, Pretoria.
- 1959 Construction Electric Co. (Pty) Ltd., Box/Bus 10100, Johannesburg.
- 1957 Crompton Parkinson S.A. (Pty) Ltd., Box/Bus 4236, Johannesburg.
- 1965 Cullinan Refractors Ltd., P.O. Olifantsfontein, Transvaal.
- 1957 Davidson & Co. (Africa) (Pty) Ltd., Box/Bus 616, Springs, Transvaal.
- 1957 Dowson & Dobson Ltd., Box/Bus 7764, Johannesburg.
- 1959 Ian Drewett, Box/Bus 25, Johannesburg.
- 1970 Dulmisen Preformed Line Products S.A. (Pty) Ltd., 180 Ortman Road, Pietermaritzburg.
- 1972 C.A. du Toit & Partners, Box/Bus 4256, Pretoria.
- 1969 Eberhard-Martin (Pty) Ltd., Box/Bus 128, Roosevelt Park.
- 1972 Egatube Plastic Conduits (Pty) Ltd., Box/Bus 140, Rosslyn, Tvl.
- 1959 Electrical Contractors Association (South Africa), Box/Bus 5327, Johannesburg.
- 1966 Electrical Protection Co. Box/Bus 570, Benoni.
- 1972 EMAG Electrical Engineering (Pty) Ltd., Box/Bus 27129, Benrose, Transvaal.
- 1957 Enfield Cables (S.A.) Ltd., Box/Bus 5289, Johannesburg.

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|------|--|------|--|
| 1961 | Farad (Pty) Ltd., Box/Bus 31220, Braamfontein. Tvl. | 1968 | Phillips Lighting Corp. S.A. (Pty) Ltd., Box/Bus 7148, Johannesburg. |
| 1957 | Fuchs Electrical Industries Ltd., Box/Bus 758, Alberton. | 1971 | Phosware (Pty) Ltd., Box/Bus 391, Springs. |
| 1959 | G.E.C.- A.E.I. of S.A.(Pty) Ltd., Box/Bus 2406, Johannesburg. | 1971 | Republic Power & Communication Co. (Pty) Ltd., Box/Bus 5440, Johannesburg. |
| 1969 | G.E.C.- English Electric of S.A. (Pty) Ltd., Box/Bus 2387, Johannesburg. | 1957 | Reunert & Lenz Ltd., Box/Bus 92, Johannesburg. |
| 1957 | G.E.G.- Power Distribution Ltd., Box/Bus 13024, Knights, Transvaal. | 1957 | Reyrolle Parsons of S.A. (Pty) Ltd., Box/Bus 8080, Elandsfontein |
| 1971 | G.R. Hain (Pty) Ltd., Box/Bus 31126, Braamfontein. Transvaal | 1960 | A. Reyrolle & Co. (Rhodesia) Ltd., Box/Bus 1975, Salisbury. Rhodesia. |
| 1962 | Haggie Rand Limited, Box/Bus 72, Cleveland. | 1957 | Rice & Diethelm Ltd., Box/Bus 930, Johannesburg. |
| 1960 | Hawker Siddeley Brush (Southern Africa) Ltd., Box/Bus 67, Germiston. | 1967 | G.S. Rogers, (Pty) Ltd., Box/Bus 3067, Johannesburg. |
| 1970 | Hawker Siddeley Electric A.T.W. (Pty) Ltd., Box/Bus 417, Roodepoort. | 1967 | S.A. National Committee on Illumination, Box/Bus 395, Pretoria. |
| 1957 | Heinemann Electric (S.A.) Ltd., Box/Bus 99, Bramley. Transvaal. | 1957 | Scottish Cables (S.A.) Ltd., Box/Bus 2882, Johannesburg. |
| 1957 | Hopkinsons S.A. (Pty) Ltd., Box/Bus 11029, Johannesburg. | 1960 | Siemens S.A. (Pty) Ltd., Box/Bus 4583, Johannesburg. |
| 1957 | Hubert Davies & Co., Ltd., Box/Bus 3762, Johannesburg. | 1969 | Simplex Electric of S.A. (Pty) Ltd., Box/Bus 7035, Johannesburg. |
| 1962 | A. Jackson, Box/Bus 4814, Cape Town. | 1960 | South Wales Electric (Pty) Ltd., Box/Bus 426, Kempton Park. |
| 1957 | R.T. Jones, Esq., The Avenue Gardens, Johannesburg. | 1970 | Steam and Mining Equipment (Pty) Ltd., Box/Bus 1039, Johannesburg. |
| 1968 | Kantey, Loteryman, Gardner & Anstey, 44 New Medical Centre, 19 St. James' Road. East London. | 1957 | Stone-Stamcor (Pty) Ltd., Box/Bus 50292, Randburg. Transvaal. |
| 1967 | Keen's Electrical Distributors (Pty) Ltd., Box/Bus 2656, Johannesburg. | 1957 | Supercola Limited, Box/Bus 31386, Braamfontein. Transvaal. |
| 1972 | Lenning Electric (Pty) Ltd., Box/Bus 9159, Elsberg. Tvl. | 1957 | Switchcraft (Pty) Limited, Box/Bus 6444, Johannesburg. |
| 1972 | Max Engineering (Pty) Ltd., Box/Bus 179, Vereeniging. | 1960 | Thorn Lighting S.A. (Pty) Ltd., Box/Bus 43075, Industria. Transvaal. |
| 1957 | L.H. Marthinusen Ltd., Box/Bus 25664, Denver. Transvaal | 1971 | Usco Cable Co. (Pty) Ltd., Box/Bus 48, Vereeniging. |
| 1967 | Merz & McLellan, Box/Bus 31012, Braamfontein, Transvaal. | 1969 | Wardle & Simpson, Box/Bus 5010, Port Elizabeth. |
| 1959 | N.V. Nederlandsche Kabelfabrieken Ltd., Box/Bus 494, Port Elizabeth. | 1965 | G.D. Wiehahn, Box/Bus 664, Bethlehem. |
| 1972 | Ove Orup & Partners, Box/Bus 10389, Johannesburg. | 1957 | Wilson & Herd (Pty) Ltd., Box/Bus 3093, Johannesburg. |
| | | 1959 | Yorkshire Transformers (S.A.) (Pty) Ltd., Box/Bus 43, Bedfordview. |

LIST OF MEMBERS, COUNCIL MEMBERS AND VISITORS ATTENDING THE 1972 TECHNICAL MEETING OF THE ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTH AFRICA AT KEMPTON PARK.

LYS VAN LEDE, RAADSLIDE EN BESOEKERS - 1972 TEGNIESE VERGADERING VAN DIE VERENIGING VAN MUNISIPALE ELEKTRISITEITSONDERNEMINGS VAN SUID-AFRIKA TE KEMPTON PARK.

COUNCIL AND ENGINEER MEMBERS

(Name of Councillor appears first except where only Engineer attended)

RAAD EN INGENIEUR-LEDE

(Die naam van die Raadslid verskyn eerste, behalwe waar slegs die Ingenieur die vergadering bygewoon het)

ALBERTON	KOKSTAD	RANDFONTEIN
N.P. de Klerk	J.L. McNeil	J.D. Weyers
BEDFORDVIEW	KOPPIES	ROBERTSON
J.W.M. Nienaber	P.J. Goussard	H.J. Koslag
BENONI	KROONSTAD	ROODEPOORT
J.A. Loubser	D. Briers	H.J. Hugo
BLOEMFONTEIN	KRUGERSDORP	P.J. Botes
A.P. van Schalkwyk	A.J. van der Berg	RUSTENBURG
BOKSBURG	LADYBRAND	J.F. van Zyl
A.H.L. Fortman	A.C. Pieterse	E.E. de Villiers
BRAKPAN	LADYSMITH	SASOLBURG
H. Barnard	E. Trautman	J.C. Strauss
BULAWAYO	MAFEKING	SPRINGS
C.L. Cosser	E.J. te Brugge	J.K. von Ahlfen
CAPE TOWN	MEYERTON	STANDERTON
I.H. Hess	A.A. Goslett	N.A. Potgieter
CARLETONVILLE	MIDDELBURG	STILFONTEIN
P.J. van der Merwe	J.E. Heydenrych	R.L. Bleach
CRADOCK	NEWCASTLE	THABAZIMBI
K.J. Murphy	M.P.P. Clarke	A.G. Zwiendelaar
DUNDEE	ORKNEY	TZANEEN
W.G. Rush	J.A. Buisset	T.J. Millen
DURBAN	PAARL	UITENIAGE
D.H. Fraser	H.C. Dreyer	J.D. Dawson
EAST LONDON	PERI-URBAN AREAS	UMTATA
H.G. Kipling	W.F. Cronje	K.H.D. McMillan
K.G. Robson	PiETERSBURG	VANDERBIJLPARK
ESTCOURT	J.I. Inglis	G.C. Theron
W. Bozyczco	J.P. Greyling	VEREENIGING
GERMINON	PORT ELIZABETH	A.F. Turnbull
C. Lombard	M.J.W. Chappel	VICTORIA WEST
GLENCOE	PORT SHEPSTONE	G.A. Huysamen
T.L. Swart	K.W.J. Halliday	WARMBATHS
HEIDELBERG (Tvl)	POSTMASBURG	B. Naude
W.J.B. van Heerden	E.E. Kobus	WELKOM
JOHANNESBURG	POTCHEFSTROOM	R.W. Barton
D.C. Plowden	E. de C. Pretorius	WESTONARIA
KEMPTON PARK	POTGIETERSRUS	L. Dreyer
L. Fatcher	G.A. Lotter	WHITE RIVER
KLERKSDORP	PRETORIA	G.W. van der Schyff
G.F. Rautenbach	E.A. McWilliam	

AFFILIATES / GEAFFILIEERDES

<u>Organisation/Organisasie</u>	<u>Name/Naam</u>	<u>Town/Stad</u>
A.E.G. - Telefunken (Pty) Ltd.	K.R. Möhl D. Korner W. Smith K. Stummeyer D. Huber	Johannesburg
A.S.E.A. Electric S.A. Ltd.	F. Frank L. Julyan	Pretoria
Aberdare Cables Africa Ltd.	T.D. Pratt	Edenvale
Adams, Ripley & Dürr	H.A. Dürr	
African Cables Ltd.	D.A.W. Holt	Vereeniging
Alcan Aluminium of S.A. Ltd.	A.H.W. Hugo	Johannesburg
Aycliffe Cables Ltd.	T.E. Wilkinson	Edenvale
Ballendon & Robb	L.B. Ballendon	Johannesburg
Brian Colquhoun, High O'Donnell & Partners	A.J.G. Gosling	Braamfontein
Brown Boveri Orsal (Pty) Ltd.	C.E. Weber B.D. Bales S. Jones D. Jones I. Varfalvi	Johannesburg
Chemilite (Pty) Ltd.	J. Wilson S.D. Gluckman H.L. Gluckman A.J. Melvin	Johannesburg
Dowson and Dobson Ltd.	R.C. Foxcroft	Johannesburg
Dulmison Preformed Line Products	G.L. Wyngard	Pietermaritzburg
EMAG Electrical Engineering	F. Walter	
Eberhardt-Martin (Pty) Ltd.	E.B. Martin	Johannesburg
Electrical Contractors' Assoc.	B. Gilbert	Johannesburg
Electrical Line Component	G.D. Walker	
Electrical Protection Co. (Pty) Limited	M.R. Marot H.P. Smith	Benoni
Enfield Cables (S.A.)(Pty) Ltd.	F.E. Jenkinson W. Allan	Johannesburg
Farad (Pty) Ltd.	G. Gerber	Braamfontein
Fuchs Electrical Industries (Pty) Ltd.	L.A. Brown D.N. Cornish V. Cohen	Alberton
G.E.C.- A.E.I. of S.A. (Pty) Ltd.	H. Frankle C.B. Wilson N.P. Gripper J.C. Coetzee	Johannesburg

<u>Organisation/Organisasie</u>	<u>Name/Naam</u>	<u>Town/Stad</u>
G.E.C. - English Electric of S.A. (Pty) Ltd.	M. Coutts-Trotter P.P. Capra	Germiston
G.R. Hain (Pty) Ltd.	G.R. Hain	Johannesburg
Haggie Rand Ltd.	A.E. Raw	Cleveland
Hawker Siddeley Electric	J.A. Barnett J. Birtles	Roodepoort
Heinemann	W. Nankervis J. Robinson	
Hopkinsons (S.A.) (Pty) Ltd.	A.D. Sayers	Johannesburg
R.T. Jones	R.T. Jones	Johannesburg
Kantey, Loteryman, Gardner & Anstey	D.A. Gardner	East London
Lenning Electric (Pty) Ltd.	R.W. Bird N.A. Malan	
Max Engineering (Pty) Ltd.	A.E. Grutzmacher	Vereeniging
Merz & McLellan (SA)	G.T. Honiball	Braamfontein
Ove Arup & Partners	R.M.O. Simpson F. Hindler	Durban Pretoria
Phosware (Pty) Ltd.	J.T. Grundy	Springs
Plastic Conduits (Pty) Ltd.	E. Stapley M. Frankle	Rosslyn
Reunert & Lenz Ltd.	T.C. Marsh R.R. Mulholland	Johannesburg
Reyrolle Parsons of S.A. Ltd.	N. Kirschner	Elandsfontein
Scottish Cables (S.A.) Ltd.	S.G. Hancock D.H. Booth J.A. Hayes	Johannesburg Pietermaritzburg
Siemens (Pty) Ltd.	W. Pierdekämper A. Stark D. Soutter	Johannesburg
Simplex Electric of S.A. (Pty) Limited	A.K. Dean J.G. Mitchell	Johannesburg
South Wales Electric	C.C. Swartz J.W. Bates J.A. Mitchell	Kempton Park
Usco Cable Co. (Pty) Ltd.	D.L. Condra D. Blignaut	Vereeniging

VISITORS / BESOEKERS

<u>Name/Naam</u>	<u>Organisation/Organisasie</u>	<u>Town/Stad</u>
J.G. Wannenburg T.M. Leff	(Department of Labour/Departement van Arbeid)	Pretoria

<u>Name/Naam</u>	<u>Organisation/Organisasie</u>	<u>Town/Stad</u>
G.H. Harden	Electricity of Supply Commission/ Elektrisiteitsvoorsieningskommissie	Johannesburg
Jan H. Smith		
I.D. van der Walt		
G.F. Stegman		
T.C. Stoffberg		
E. Dalton	The Institution of Certificated Mechanical and Electrical Engineers	Marshalltown
R.S. Yates	Author of Paper/Skrywer van Referaat	Johannesburg
A.J. Eriksson *	(National Institute for Electrical Research/Nasionale Navorsings- instituut vir Elektriese Ingenieurswese	Pretoria
J.D.N. van Wyk		
R.B. Anderson		
Dr F.J. Hewitt		
J.R.N. Mackay	Provincial Administration of the Cape of Good Hope/Provinsiale Administrasie van die Goeie Hoop	Cape Town
P.F. Peach	Public Works Department/Departement van Nywerheidswese	Pretoria
A.A. Middlecote*		
J.W. Smit	S.A. Bureau of Standards	Pretoria
J.V. Grant	S-A Buro van Standaard	
J.C. van Alphen		
F.J. Prins		
R.W. Barton	S.A. National Committee of Illumination S-A Nasionale Komitee vir Verligting	Johannesburg
A.E. Lopes	Servicos Municipalizados de Agua e Electricidade	Lorenco Marques
A. Winchester	South African Railways/Suid- Afrikaanse Spoorweë	Johannesburg
R.E. Friede	Swaziland Electricity Board	Mbabane
P.B. Power	S.A. Institution of Mechanical Engineers/S-A Instituut van Meganiese Ingenieurs	Johannesburg
E.C. Lynch	City Electrical Engineer, Salisbury Elektrotegniese Stadsingenieur	Salisbury
H.J.A. Moore	Transvaal Education Department/ Transvaalse Onderwysdepartement	Pretoria
D.C. Plowden	S.A. Institute of Electrical Engineers	Johannesburg
L.H. Hare	Central Organisation for Trade Testing	Olifantsfontein

* Author of Paper / Skrywer van Referaat

OTHER MEMBERS / ANDER LEDE

J. Barrie	Past Member	Johannesburg
W.P. Ford	Past Member	Maseru
R.M.O. Simpson	Honorary Member	Durban

R.G. Ewing	Representing the Secretaries/Verteenwoordiger van die Sekretariaat	East London
Miss E.R. Brewin	Representing the Secretaries/Verteenwoordiger van die Sekretariaat	Johannesburg
P.J. Conradie	Official Translator/Amtelike Vertaler	Vanderbijlpark
W.J. Botha	(Sonex - Sound Engineering/Sonex Klank Tegniek	East London
Mrs R.E. Kleb		

LADIES / DAMES

(Read Mrs unless otherwise indicated)

<u>Name/Naam</u>	<u>Town/Stad</u>	<u>Name/Naam</u>	<u>Town/Stad</u>
J.A. Barnett	Roodepoort	N. Kirshner	Elandsfontein
J. Birtles	Roodepoort	C. Lombard	Germiston
E. Dalton	Marshalltown	E.B. Martin	Roosevelt Park
J. Dawson	Uitenhage	T.D. Pratt	Edenvale
W.P. Ford	Maseru	A.D. Sayers	Johannesburg
D.A. Gardner	East London	T.L. Swart	Glencoe
A.J.G. Gosling	Braamfontein	R.M.O. Simpson	Durban
I.H. Hess	Cape Town	W.J.B. van Heerden	Heidelberg Tvl.

APOLOGIES / VERSKONINGSCOUNCIL AND ENGINEER MEMBERS

Municipality of Bethlehem
 Beaufort West Municipality
 Municipality of Dewetsdorp
 Town Council of Ermelo
 Municipality of Gobabis
 City of Kimberley
 Town Council of Lichtenburg
 Municipality of Louis Trichardt
 Municipality of Parys
 Town Council of Piet Retief
 Municipality of Port Alfred
 Municipality of Riversdale
 Village Management Board of Virginia
 Town Council of Witbank

RADE EN INGENIEURS-LEDE

Munisipaliteit van Bethelém
 Beaufort-Wes Munisipaliteit
 Munisipaliteit van Dewetsdorp
 Stadsraad van Ermelo
 Munisipaliteit van Gobabis
 Stad Kimberley
 Stadsraad van Lichtenburg
 Munisipaliteit van Louis Trichardt
 Munisipaliteit van Parys
 Stadsraad van Piet Retief
 Munisipaliteit van Port Alfred
 Munisipaliteit van Riversdal
 Dorpsbestuur van Virginia
 Stadsraad van Witbank

AFFILIATES

A Reyrolle & Co. (Rhodesia) Ltd.

GEAFFILIEERDES

A Reyrolle & Kie (Rhodesië) Bpk.

VISITORS

Central Electricity Board, Mauritius
 Electricity Supply Commission, Durban

BESOEKERS

Central Electricity Board - Mauritius
 Elektrisiteitsvoorsieningskommissie - Durban

Department of Works, Rhodesia
 Armaments Board, Pretoria
 Natal Provincial Administration
 Minister of Transport & Power - Salisbury

Departement van Werke, Rhodesië
 Krygtuigsraad, Pretoria
 Natalse Provinsiale Administrasie
 Die Minister van Vervoer en Krag - Salisbury

APOLOGIES / VERSKONINGS

VISITORS

Orange Free State Province
(Steel & Engineering Industries
Federation of S.A. - Johannesburg
Southern Rhodesia Electricity Council
- Salisbury
S.A. Federated Chamber of Industries
- Pretoria
United Municipal Executive of S.A.
- Pretoria

BESOEKERS

Provinsie Oranje-Vrystaat
(Steel & Engineering Industries
Federasie van S-A - Johannesburg
Suidelike Rhodesië Elektrisiteits
Raad - Salisbury
Suid-Afrikaanse Gefedereerde Kamer
van Nywerhede - Pretoria
Verenigde Munisipale Bestuur van
Suid-Afrika - Pretoria

Telegrams received from / Telegramme ontvang van:

F. Stevens (Honorary Member/Ere-Lid)
S.T. Collins (on hijacked aircraft/op geskaakte vliegtuig)

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The Association of Municipal Electricity
Undertakings of Southern Africa
TECHNICAL MEETING 1972

Die Vereniging van Munisipale Elektriesel-
ondernemings van Suidelike Afrika
TEGNIÛSE VERGADERING 1972

HOLIDAY INN, JAN SMUTS, KEMPTON PARK, JOHANNESBURG

Opening Session (Thursday, 25th May, 1972)

The President opened the proceedings by extending a hearty welcome to all the delegates present to the 4th Technical Meeting of the Association, especially Mr E.C. Lynch (Salisbury) and Mr C.L. Cosser (Umtali) and all other visitors.

There were apologies from Mr Jack Waddy, the Vice President, who had been involved in an accident and broken his pelvis, and also from Dr. Hewitt from the CSIR who was due to leave on an urgent visit overseas.

After a few preliminary announcements as to the transport arrangements for the Mayor's cocktail party to be held that evening and the choice of restaurants for lunch, the President encouraged delegates to avail themselves of the opportunity to look over Mr Len Fitcher's Control Centre and to collect certain papers in the foyer relating to the material to be discussed by Mr L.H. Hare of the Central Organisation for Trade Testing.

The President proceeded to explain the innovation to the Technical Meeting by way of the introduction of four Forum Sessions - 1 Affiliate and 3 Branch Sessions - in addition to the three papers scheduled to be delivered to the convention; each Branch Session to be chaired by the Branch chairman concerned and the Affiliate Session, by an Affiliate representative.

The President continued: Gentlemen, I suggest that we proceed with our Agenda the first item of which is a paper by Mr Eriksson of the CSIR. He has done a great amount of research and is well qualified to address us on his subject and I have pleasure in calling upon him to do so. (applause)

Mr A.J. ERIKSSON, M.Sc.(Eng.), Pr.Eng., A.M.I.E.E., Grad. S.A.I.E.E., Senior Research Officer, National Electrical Engineering Research Institute, (CSIR) then delivered his paper entitled "RECENT DEVELOPMENTS IN THE FIELD OF ELECTRICAL INSULATION" illustrating it with slides - see Vol. 1 of the published Proceedings.

After thanking Mr Eriksson the President took the opportunity of welcoming the Mayor of Kempton Park who had just arrived and inviting him to sit in on the meeting for as long as he wished. He went on to explain the presence of Mr Pretorius on the platform, saying that as a member of the Management he was well qualified to assist him in the absence of Mr Waddy.

He continued: Gentlemen, before I open the paper for discussion there are a few comments I'd like to make myself:-

i) The author says on p. 5 that "cross-linked polyethylene cables have particular economic advantages over oil-paper insulated cables" and that in Australia, for example, the cost definitely shows economic advantages. My own experience in South Africa has been that not all the conductor sizes are available (only up to about 150 sq.mm.) and that the price and delivery are well beyond that of the paper cable; all of which would seem to contradict the findings in Australia.

ii) We've heard about this cable and it seems to be well established as a cable for the future yet I know of no South African specification covering it. It would be interesting to hear what the problems are, if any, in this regard, and what progress has been made.

iii) Then there is the question of the testing of this cable: we as consumers or users of this cable have to do field tests. The author has referred mainly to scientific and laboratory tests but some more information on how to adapt these to field tests would be very welcome.

Gentlemen, I think you'll agree with me that Mr Eriksson has given us a very interesting paper and I'm looking forward to an equally interesting discussion so I now invite discussion on this paper.

F.J. Prins (SABS, Pretoria): Mnr. die President, ek ken mnr. Eriksson nie en ek het hom maar vanmôre vir die eerste keer hier gesien so ek is nie

vooral/...

vooraf gekondisioneer oor wat hy hier gesê het nie. Toe ek sy referaat deurgewerk het, het dit verskeie reaksies by my opgewek, en een daarvan was of hierdie man nou doelbewus 'n klip in die bos kom gooi het om te sien wat se reaksie hy uitlok, en of hy miskien oor geheime informasie beskik. In elk geval, om so kaalkop en kaal hande in 'n wilde byenes te gaan krap sit nie in elke man se broek nie en ek dink hy verdien, uit daardie oogpunt, alle lof vir sy poging!

Mr President, in commenting on the paper by Mr Eriksson I have been mainly inspired by the remark on page 4 of his paper: "the field has become dominated by the increasing use of low loss polymeric materials, in place of the less efficient oilpaper dielectrics". I may seem to be digressing in what I have to say next but you will see in the end what I'm driving at. On a number of occasions we have been approached by people who have developed a new jointing kit or terminating kit for electric cables requesting that we draw up a specification for such kits. It usually takes quite a bit of explaining to bring it home to them that no matter how well conceived it may be or how good are the components used in that kit, somewhere along the line a human being still has to make that joint or that termination and it is because of this human element that nobody has yet drawn up such a specification, to my knowledge.

This reminds me of a case some years ago when an engineer on the East Rand phoned me to say that he was sending me an 11kV box with a bit of cable which had failed in service, asking if we could suggest a possible cause for the failure. As a routine matter I had the box X-rayed before we started stripping and I was not surprised to find that there were no moisture gaps provided. Yet when I phoned him he simply would not believe me since he himself had trained the man who had done the joint; this man having worked for him for more than 20 years and, in his opinion, being probably one of the best jointers on the Reef, and fully aware therefore of the importance of moisture gaps.

I know of another instance in Europe where a polyethylene-insulated cable was factory-made to length, terminated to the length required for installation,

checked for partial discharges and then installed. The cable was faulty after installation due to blisters being torn between the conductor screen and the dielectric during handling.

I've had the privilege of talking to various people on cable materials and design and four of the top cable people in my estimation - one from the U.S.A., one from the U.K., one from Europe and one from Scandinavia - expressed the opinion that the cable that has proven itself over and over again; that has operated all over the world for 60 years and more and will happily carry on doing so for a further 60 years if not subjected to any extraneous influence, is the cable consisting of a copper conductor, impregnated with oilpaper insulation, lead or lead alloy sheath. I happen to know of one such cable in South Africa which has been operating in the Durban area for the past 60 years and is expected to last for another 60 years.

There have been reports from the States and Japan on experiences with polyethylene insulated cables which seems to throw some doubt on their use, one of these being about the chemical and electrical "treeing" which occurs and the disturbing aspect that some of this "treeing" cannot be picked up by partial discharge testing.

Another interesting point that has come to light in these investigations, following failures with polyethylene insulated cables 5 to 8 years in use, is that it would appear that copper conductors are more subject to some of these attacks - especially the chemical "treeing": cuprous sulphide treeing formation - than the aluminium conductors. Aluminium in that case then scores over copper.

Mr President, I'm not trying to condemn polyethylene. Polyethylene - in its other form too, cross-linked polyethylene - is an excellent dielectric and for many applications I would make it my first choice, but one has to consider all the facts when you are deciding what cable you are going to install where, as there are so many points that come up e.g. the expected life of the cable installation. If you were arguing along American lines of practice you would probably think 15 years quite good enough but if you were wanting a cable to last 60 years you would have to alter your thinking considerably.

Other aspects are the conditions of installation, the type of labour available, the proficiency of your technical people, continuance of supply and of course, costs, which all come into it too. It's an interesting point, I think, that if one were to capitalise costs you'd probably find that the cable running coolest is the cheapest cable in the long run.

The cable engineer today is, in this changing world of ours, faced with so many new problems and hazards that an institution such as we have at the CSIR and the work that Mr Eriksson is doing is really very necessary. There are so many new materials, new approaches: there are the new rubbers, EPR and EPDM; there are the excellent jacketing materials, Neoprene and Hypalon; there are other products coming up and threatening our old paper cable. One of the most important points to bear in mind is electrolysis which makes it very important that one has a really dependable, long-term outer protection because once the protection is gone you're going to have trouble with your lead or lead alloy sheath.

So when one considers all these facts I think one should really be very careful about making statements and drawing conclusions. Thank you, Mr President. (applause)

PRESIDENT: Thank you, Mr Prins. Any further discussion on this paper?

D.H. Booth (Scottish Cables (S.A.) Ltd., Pietermaritzburg): I shall confine my remarks to Section 2 of the paper i.e. the section on cables, and even so, I'm afraid time will only allow a few general observations on a paper which could, in fact, be discussed practically on a line-by-line basis.

In my view the paper tends to continue the myth that the polyethylene family of materials are simple in structure in their associated manufacturing procedures and in their performance in service. In point of fact, this apparent simplicity has, ever since their original development in the 1930's, been shown to be one of the major pitfalls in their promotion in the electrical field. As an example of this: after the first wave of enthusiasm that we had in the late 1930's with the polyethylene family universal insulant, it was recognised that the most practical field of application lay not in the power field but in the communication field because there problems of thermal and

electric stress conditioning, which have been recognised, were not important. Against this background I think it's worthwhile to note that at this very moment, some 30 years later, there are major problems in North America with telephone cables, arising through long-term deterioration and environmental cracking.

If I turn now to what is, in fact, the main interest of this conference - obviously, the use of the polyethylenes in the power cable field - one must say immediately that no one can disagree with the author that the materials do offer very important advantages because of their potential for simple jointing techniques. The author quite correctly emphasises the problems arising from the low discharge resistance of these materials and discusses short-term "treeing" phenomena which could arise from the use of contaminated materials or poor manufacturing techniques. Quite frankly, however, these are problems of a decade ago and any competent manufacturer today is equipped by knowledge, suitable manufacturing plant and testing equipment to avoid these difficulties.

However, in keeping with the history of this family of materials, with the overcoming of one set of problems, yet a further one comes into prominence. In this case we're now facing difficulties in service, as mentioned by Mr Prins, arising from long-term degradation, again associated with "treeing" phenomena, but now caused by external agencies such as may result from water or sulphide contamination. The possibility of such breakdown mechanisms has been known to research workers for many years. It is only now with service experience in Japan, the country with the longest use of cross-linked polyethylene, and the U.S.A., that the problem has been highlighted. I would like just to interject to confirm the slightly tentative view that Mr Prins gave that, in fact, this type of deterioration cannot be detected by partial discharge testing. Unfortunately, having been involved with a number of failures from this cause, I can only too readily confirm this view. I am extremely surprised, however, that the author has not included in his bibliography any reference to what has become, in the last two years, a very

well-documented/...

well-documented situation. But having said all this I would like equally to make the point that, as with short-term failures arising from discharge phenomena, there's no doubt that solutions will be found to this problem and, in fact, the majority of cable companies throughout the world are spending large sums of money on research in this field.

Turning now to what may perhaps be considered a point of detail, I would like to comment on the considerable stress that the author lays on the advantage of triple extrusion as a method of avoiding discharges at the very critical insulation core-screen interphase. If I can be permitted a particularly pedantic criticism, I do feel that on occasions the author jumps from the manufacturing techniques associated with linear polyethylene to those associated with cross-linked polyethylene rather too easily. The extrusion problems associated with linear polyethylene which involve quite simple extrusion techniques, are in one ball park whereas those associated with cross-linked polyethylene which involve the problems of vulcanisation under pressure, are in a completely different one.

As the paper is primarily concerned with cross-linked polyethylene my remarks are confined to that and I feel I must say that though the author does lay such stress on triple extrusion, the facts of the situation are that there is very little use being made today of triple extrusion in the manufacture of cross-linked polyethylene cables. In fact, when an extruded outer screen is used, this is normally applied as a separate process, notably in North America where we even have a thermo-plastic base which, in fact, destroys some of the other thermal characteristics of the cross-linked polyethylene. The difficulty here is that although no one could dispute that from the cable point of view the very tight screen advocated by the author is an advantage, from the jointing point of view this is a singular disadvantage, particularly with shaped conductors: many authorities consider that a painted screen followed by some form of semi-conducting tape, is the best practical compromise.

In/...

In turning now to the economic side of the paper, I do recognise that commenting upon economics in a technical paper is not an easy matter but a very essential one. Mr Eriksson said that he put in the economics to satisfy the accountants. I would have preferred him to say that he put it in to satisfy the engineers and not the physicists.

It's unfortunate, in my view, that the author has chosen as his main reference in his economic section, the paper by J.L. Stewart of Australia. Those of us who are familiar with the Australian situation will know that, in fact, Mr Stewart is a very isolated man in Australia representing the minority view. I think it is worth noting that under pressure from the supply authorities in Australia, who have also done their economic sums, the cable companies in Australia are this year increasing their paper cable manufacturing capacity.

It is, in my view, wise in a technical paper to assess cost relationships rather than make judgements on isolated pricing data which can be affected by factors other than basic cost. If one does this on a basis of comparing cables of similar technical performance, particularly in relation to full current-carrying capacity and external protection of the insulation to avoid the environmental hazards mentioned earlier, the cost relationships become quite clear as, in fact, indicated by you, sir.

The cross-linked polyethylene cable is marginally more costly than the equivalent lead sheath, solid cable and, secondly, it is substantially more costly than any form of pressure type cable. The first case is probably the one of greater interest to this conference and, following the pattern in all parts of the world, there is a division in South Africa between those engineers who believe that the higher cable cost is more than compensated for by reduced installation and jointing costs and those (usually those with very large established jointer forces) who feel that this argument cannot yet be substantiated.

From these economic facts it follows that cross-linked polyethylene cables can only be shown to have significant economic advantages by making changes of basic design which involve technical risks and fundamental changes in system design philosophy. These reasons may be justified in the total economic exercise e.g. if you believe in the economic practice of relay after 10 to 15

years. But there must be no doubt in the user's mind, if this course is followed, that potentially serious risks are being taken.

To state, as the author does, that the problems encountered in the manufacture of polyethylene cables (I presume he means cross-linked as well) have been generally overcome is, I believe, misleading. Certainly the majority of manufacturing problems, taken in their very strictest sense, have been overcome, but this does not mean that the problems which can arise in service from the total engineering concept have been fully understood or even, quite frankly, identified.

In conclusion the point that I'm really trying to make is this: as I said at the beginning there is no doubt at all that these materials do offer considerable potential and, in fact, will ultimately probably take over from impregnated paper. However, it is equally important that one does understand the problems that are involved, particularly if one is taking what I consider a degree of risk in basically changing designs in order to get an advantage in the initial cost of the cable. If this is done I suggest that it is possible that the cost ultimately to the industry could be very much greater than that associated with the initial cost savings. Thank you. (applause)

PRESIDENT: Thank you, Mr Booth. Any further discussion ?

P.J. Botes (Roodepoort): Mnr. die President, as koördinerende teenwoordiger op die SABS hoop ek dat hier wat ek nou gaan sê nie my toekomstige samewerking met die SABS skade gaan aandoen nie.

Kruisgebondepoliëtileen kables word deur gebruikers in baie groot hoeveelhede aangekoop. Vervaardigers installeer toerusting om hierdie tipe kables te vervaardig in hierdie land. Die verskil van prys tussen hierdie kables en die papiergeïsoleerde loodmantelkabel daal. In Roodepoort word duisende meter van hierdie kabel gebruik op 11kV, dus ver sonder probleme.

Onlangs is sterk oorweging gegee aan die aankoop van 'n 33kV kruisverbondepoliëtileen kabel. Daar is egter 'n leemte in die opstel van spesifikasies en toegang kan alleenlik tot internasionale literatuur verkry word. Dit lyk vir my dat nieteenstaande die absolute pessimistiese uitkyk van die SABS oor

die gebruik van hierdie tipe kabel, gebruikers en vervaardigers meer optimisties is in hierdie land. In plaas van absolute negatiewe uitkyk kan ons nie meer positiewe denking verkry van die SABS nie ?

Die stelling dat die ou tipe papiergeïsoleerde loodmantelkabel 66 jaar diensgedoen het en nog 66 jaar diens kan doen hou nie van my stand nie. Ons leef in 'n moderne tydperk en ons moet die toekoms tegemoetkom. Dankie, mnr. die President. (applous)

PRESIDENT: Dankie, mnr. Botes. Ek hoop u stelling kom waar dat ek nou gaan aanby op die Buro van Standaarde se komitees! (gelag)

E.E. de Villiers (Rustenburg): Mnr. die President, ek sal maar sommer dadelik erken ek het nie tyd gehad om die referaat in besonderhede te bestudeer nie maar ek wil darem een of twee opmerkings maak as u my sal toelaat.

In die eerste plek wil ek eers terugkom op die ou PVC-kabels. U weet dat ingenieurs deur die wêreld, en veral in ons land, was nie baie lus vir PVC-kabels sowat 20 jaar of wat gelede nie, maar u weet in hoe 'n mate die tans gebruik word. Ek dink daar is seker genoeg PVC-kabels in ons land geïnstalleer wat saam met die Amerikaners kan maan toe gaan en weer terugkom!

Wat die poliëtileen betref: ek het nie veel ondervinding daarvan nie maar een punt van baie belang vir my (waar die ook saamloop met PVC) is die feit dat jy nie die groot probleme het met vog nie, veral ook wat jou deurlas en eindafmaak prosedures betref. Daar is 'n geweldige besparing in kostes as u 'n grootskaals hoogspanningskabel moet installeer met baie laste.

Mnr. die President, die ander groot voordeel wat ek daarin sien en wat eintlik basies die oorsaak daarvan was dat twee redelike lengtes van die kabel in Rustenburg installeer was, is die feit dat jy nie die probleem van olie-dreinerings het met die kabel as wat jy het met die gewone papiergeïsoleerde kabel waar jy teen geweldige hellings kabel moet lê nie.

Dan wil ek net een puntjie verder gevra het terwyl ek oor die PVC praat: in tabel 2 het mnr. Eriksson nou vir ons die verskeie syfers gegee van die tipes isoleermateriaal maar ek sal graag wou gesien het dat PVC daar verskyn as 'n

vergeljking/...

vergelyking. Ek dink hy staan nie baie ver terug nie alhoewel ek weet nie in hoe 'n mate dit wel oorsee vroeër jare in gebruik geneem was nie, maar ek het verstaan dat PVC wel ook vir ekstra hoogspannings doeleindes gebruik was as isoleermateriaal. Mnr. Eriksson kan miskien vir ons meer inligting daaroor gee.

Aan die anderkant moet ek ook weer saamstem tot 'n groot mate met mnr. Prins en andere dat die ou tipe kabel is al soveel jare in gebruik en die tegnieke van vervaardiging, lasmetodes feitlik perfek gemaak, en die ouer ingenieurs is 'n bietjie skrikkerig vir nuwe materiale.

So ek dink daar sal miskien nog heelwat water in die see loop voordat ons kan sê die papierkabelfabrieke kan maar toemaak of hulle ou masjinerie aan iemand wat nie beter weet nie kan verkoop en gaan maar net vir poliëtileen. Dankie, mnr. die President. (applous)

PRESIDENT: Dankie, mnr. de Villiers. Verdere bespreking op die referaat?

H. Barnard (Brakpan): Mnr. die President, eerstens wil ek net die skrywer van hierdie artikel baie gelukwens. Ek dink hy het besonder baie moeite gedoen op 'n veld wat vir ons nog baie onbekend is. Van die verbruiker se kant is daar egter probleme wat opduik en ek dink hulle behoort aandag te geniet.

Firstly, when it comes to using cross-linked polyethylene cable as such, you have to consider where you're going to use it - on the high voltage or the low voltage side. As far as most municipalities are concerned at the moment the highest voltage used on cross-linked polyethylene cables is 11kV and I don't think up to those voltages you have to worry too much about the particular problems mentioned by the author.

Another problem that occurs with the use of cross-linked polyethylene is how you're going to use it - is it going to be in separate single cores or laid up and twisted together and covered with armouring etc. This is quite a controversial point with various municipalities at the moment but I don't think there's going to be any problem as far as that is concerned apart from the

question/...

question of the jointing kits available for these cross-linked polyethylene cables.

I was wondering where the responsibility actually lies for these kits which seem to be so difficult to obtain. Should the cable manufacturer be held responsible therefor or should accessory companies supply these kits of which there is a very wide variety on the market at the moment. If municipalities and other consumers invited tenders for the supply of this type of cable and specified in their specification that tenderers were to be responsible for supplying jointing kits with these cables I wonder what the response would be.

One other point where we have experienced difficulty with cross-linked polyethylene cables is when it comes to making joints as compared with conventional and other cables. Cross-linked polyethylene is a very tough, hard type of insulation compared to plastic and unless the conductor itself is well rounded off when the PVC is extruded it is forced into the individual strands and is practically impossible to remove without opening the strands to take the insulation off, which is very time-consuming and not always successful.

The SABS is in a very difficult position here in that it is their job to investigate these matters but they are not always in a position to conduct the necessary field tests. Since we as consumers rely on information from the SABS to guide us regarding this type of problem I do feel that in all fairness we should take the trouble to submit detailed records in the case of failure thus enabling the SABS to supply valuable information to various municipalities, which they have gleaned from all over the country.

Dan is daar net 'n laaste item: dit lyk vir my so dat die mense is baie skikkerig vir enige iets nuuts op die mark. Ek het so bietjie rondgekyk en opgelet dat die vorige sprekers altwee splinternuwe karre ry. Nou ja, as hulle weer kar koop lyk dit vir my hulle moet kyk of hulle nie maar 'n nuwe 1935 Chevy kan kry of iets van die aard nie! (gelag en applous)

PRESIDENT: Dankie, mnr. Barnard. Gentlemen, since we've got 7 minutes in hand I think we'll give Mr Eriksson a chance to reply to the questions put so far.

A.J. Eriksson/...

A.J. Eriksson (National Institute for Electrical Research, Pretoria): Mr President, I don't think I can tackle every item that's been brought up. I find that I must sympathise with Mr Stewart in Australia in his position as a lonesome proponent of polyethylene! However, I do feel that in this country we have been very conservative in our attitudes toward new polymeric materials. I must again emphasise that my objective in this paper was not to sell polyethylene to you or to our local cable manufacturers. I merely chose this as an example of one of the new emerging materials which offers great promise, and I feel we should perhaps be a little more objective in our outlook on this.

Perhaps if I quote one or two statistics it may put things a little more in perspective. At the recent Underground Residential Distribution Conference in the United States in September last year it was reported that approximately 45 000 miles of polythene cable is now in service in either polythene or cross-linked polyethylene form. This has been put into service during the last approximately 11 years.

At present the failure rate with this cable over the full voltage range is approximately 9,3 faults per 100 kilometers. But just to enlarge on that a little, it is found that 8,6 faults per 100 kilometers of this 9,3 are in fact faults due to the 'dig-ins' of these cables during construction; purely handling; in other words, user faults and nothing to do with the manufacture of the cable. In fact, the basic faults due purely to the inherent condition of the cable - one might say inherent to polyethylene or consequential to manufacturing - have been only 0,9 faults per 100 kilometers.

A similar survey carried out in Switzerland - another country where there are approximately 45 000 kilometers of cable in service - has found that apart from mechanical damage the ratio of faults that remain is only 0,5 faults per 100 kilometers. I'd be very interested to hear from some users in this country what the basic fault rate is for oilpaper cable.

I do feel, though, that these fault rates are fairly low and that the dangers of "treeing", whether chemical, electrical or any other form, are perhaps a little over-emphasized. Not that I deny that many problems still exist but,

as an insulation engineer looking at the future trends, I feel that polyethylene is a material with great potential and that it will gradually replace existing systems.

I certainly agree that there are many problems still left as regards the manufacture and use of this cable and I'm well aware of the particularly unhappy history that the British manufacturers have had; but I would again emphasise that there has been considerable success with these materials in European countries and in the United States.

Mr President, I don't think I'd better go on any longer. I agree this is a subject on which we could probably talk for the rest of the day.

PRESIDENT: Thank you, Mr Eriksson. Gentlemen, we will now adjourn for tea.

PRE-LUNCH SESSION (Thursday, 25th May, 1972)

The President announced the venue of the cocktail party to be held that evening and clarified the luncheon arrangements.

It was then decided, with the agreement of the delegates, that the next item on the agenda, the Affiliates Session, be limited to an hour so as to allow for further discussion on the paper given by Mr Eriksson, at 12 o'clock.

The President then called on Mr E.B. Martin who had been appointed Chairman for that session to take his place on the platform.

E.B. Martin (Quizmaster), Eberhardt-Martin (Pty.) Ltd., Johannesburg: Thank you, Mr President. I'm sure I express the views of all the affiliates here when I say that we very much appreciate this opportunity of putting our questions to the AMEU and the opportunity to benefit from the wide experience of the municipal engineers here represented.

We haven't got a great many questions and I feel the response has been

disappointing/...

disappointing but there are quite a few controversial matters which have been raised and we look forward to a lively discussion.

The questions deal mainly with the Wiring Regulations and we will start with Question 3 which boils down to the fact that relaxation in Wiring Regulations (such as the distance of socket outlet to water tap) is allowed where earth leakage protection is fitted, and the question is whether there could not be similar relaxations in the main earthing, such as earthing of roofs, where there is earth leakage protection.

As this question was posed by Mr G.R. Hain I should like him to introduce his question and elaborate on it if he so wishes.

G.R. Hain (G.R. Hain (Pty.) Ltd., Johannesburg): Mr President, ladies and gentlemen, this question is a contentious one involving as it does the question of earthing. It's main object is to introduce, in terms of safety, a relationship of protection to cost to the consumer, and in so doing, high-lighting a means whereby costs can be reduced and/or alternatively improved protection fitted at the same cost.

The labour factor is a very predominant one in electrical installation work especially where earthing is concerned. Complying with Regulation 1313 costs anything from R50-00 to R100-00 on an average home which I feel is high when related to the additional safety provided, bearing in mind the trend towards tiled roofs, insulated ceilings and underground service connections. The possibility of short insulator lengths of guttering on roofs and outbuildings becoming alive is extremely remote and the question arises as to how far to go with earthing - do we have to consider metal door-frames, towel-rails etc. ?

It has been authoritatively stated that most electrical accidents arise not so much from bad installations as from improvisation to existing ones. This I feel is directly due to inadequacy of installations which can only be rectified by legislation.

I would like to suggest that qualifications be added to this Regulation

such that it is enforced only where metal roofs are fitted and where overhead service connections apply.

Relaxation where earth leakage is fitted could also compensate for the cost of fitting the earth leakage. The question is a very involved one and I would be interested to hear further comments.

Quizmaster (E.B. Martin): Thank you, Mr Hain. Gentlemen, we are fortunate in again having with us Mr Wannenburg who has given us very valuable advice on the attitude of the Department and the interpretation of regulations. To start off perhaps he would give us his views on this question.

Mr Wannenburg, however, said that he would prefer to hear the views of the meeting before expressing his views and the subject was then thrown open for general discussion.

J.V. Grant (SABS, Pretoria): This question of earthing of roofs and downpipes has exercised our minds for some time in this country. As one of the supposedly leading lights on the Wiring Regulations Committee I feel I ought to put forward one of the main ideas that has recently come up, and that is the use of earth leakage protection as a compulsory measure of protection, particularly for domestic houses. This was discussed at the Wiring Regulations Committee meeting earlier this year and the Committee agreed to establish a Working Group to rewrite the Regulations. This Working Group was directed by the Main Committee to formulate a regulation to the effect that earth leakage should be made compulsory in all domestic installations for socket outlet and lighting circuits. As most members here will remember, this was discussed at Cape Town, after which we carried out an inspection, of which this was the result.

I might possibly put forward my own personal view here - I can't speak for the Wiring Regulations Committee as we haven't discussed this particular problem - which is that if earth leakage does become compulsory then the need for earthing of gutters and downpipes, particularly with underground service connections and also with non-conducting roofs such as tiles and slates, is no

longer/...

longer essential. I feel too the economics of earth leakage could possibly be offset by this.

I think that's all I have to say, Mr President. Thank you.

Quizmaster: Thank you, Mr Grant. Any further discussion on this question ?

R.B. Anderson (CSIR, Pretoria): Just one small point in connection with the

last remarks, Mr President. I think it might be dangerous not to earth a metal roof from a lightning point of view in that these roofs rise in potential with the change of the electric field.

This is a problem with thatched roofs, for example, with metal underneath the thatch, and it can just as easily be a problem with metal roofs if they're not earthed. I think this ought to be borne in mind.

H. Barnard (Brakpan): Mr Quizmaster, I just want to mention a few things here which seem to confuse the issue. Firstly, the Regulation states that all roofs, downpipes, bath outlet pipes etc., should be earthed. However, it is becoming more and more difficult to do so as we progress and science comes up with new gadgets every day. I'd like to know, for instance, how one can possibly earth downpipes, gutters, water mains etc., that are made of plastic!

Only recently one of our inspectors complained to me that he could not test an installation because the bath was not earthed and there was no provision anywhere on the bath for it to be earthed; neither could he earth the downpipe because it was made of plastic. I feel very strongly that the Regulation should be updated in accordance with the advances of science in this particular case.

Using the water supply pipe as an earth doesn't carry any weight anymore because that is also plastic nowadays, and I feel that the answer there most probably lies in the installation of earth leakage relays covering the whole of the system.

I've always been rather concerned about the earthing of roofs and downpipes

because/...

because apart from the danger of lightning striking the building, I feel this is a real danger. We had three accidents on a roof and these were all fatal, which would not have been the case had the roofs not been earthed. Thank you.

Quizmaster: Thank you, Mr Barnard. I think that's a very valid point: that regulations should be kept up to date to allow for changing technology.

E.E. de Villiers (Rustenburg): Mr Quizmaster, I think at the outset I should perhaps correct something (and save Mr Wannenburg doing so); both Reg. C61, 2(b) of the Factories Act and Reg. 1313 of the present Wiring Regulations state specifically, "metal roofs, etc.," Therefore the problem of trying to earth a plastic one simply doesn't arise and would be quite futile in any case.

As regards the remark about the earthing of baths: this is something which is going to be considered by this Committee for the revision of the Regulations i.e. that baths must be fitted with a proper earthing terminal.

Quizmaster: Thank you, Mr de Villiers. Any further contributions on this question?

C. Lombard (Germiston): Mr Quizmaster, we don't seem to be discussing the question that was actually posed here, as to whether it would be in the interests of safety to test all installations whenever there is a change of occupancy or ownership.

The answer to that is, of course, that it would certainly be in the interests of safety but hardly practicable. Imagine the chaos at the end of the month trying to find the staff to test installations with the change of occupancy of flats for example. It would be absolutely impossible. Thank you.

(Mr Lombard actually jumped the gun here as it was question 3 under discussion)

Quizmaster: Thank you, Mr Lombard. If there are no further contributions I will now call on Mr Wannenburg to let us have his ideas on this question,

i.e./...

i.e. question 3.

J.G. Wannenburg (Department of Labour, Pretoria): As far as the earthing of metal roofs is concerned Mr de Villiers is quite right: Reg. C61 refers to metal roofs only. From my point of view (and here I'm not interpreting Government policy at all) if you have a good earth leakage protection device on the system I can't see the point of earthing the roof, particularly if the power is supplied from underground and not overhead. I also see no point in the earthing of gutters on non-conductive roofs unless it is merely to do away with static of any form.

Plastic connections: I've seen some houses in Pretoria where earthing is wrapped around plastic. This is simply a farce as it is a non-conducting material!

Mr Quizmaster, the Department would welcome suggestions put forward by the AMEU either directly to them or to the Bureau of Standards who are working on the Regulations, to enable us to come to some sort of agreement as to what to do there.

Quizmaster: Thank you, Mr Wannenburg. I think this is something that should be straightened out and I'm sure that the Association will look into the matter so as to try to ensure that the regulations say what they really mean.

M.P.P. Clark (Newcastle): Mr Quizmaster, I don't want to steal anybody's thunder but there is a point arising from the earthing of roofs which I believe could well be aired at this stage. There are trade tiles (I think called "Harvey" tiles) which are sections of pressed steel with a 'Mastic' and other type of coating. Would the members indicate for our mutual benefit what earthing is done on these steel roofs. In other words, are they taking four corners or two corners or something of the sort in order to comply with the Regulations?

Quizmaster: Thank you, Mr Clark. I think this is something which was touched upon at Potchefstroom without any definite conclusion. However, that was two

years/...

years ago. If any members have got up-to-date experience or views on this subject we'd be very happy to hear them.

D.C. Plowden (Johannesburg): Mr Quizmaster, I hadn't intended speaking on this but I think that any suggestion that earthing should be abandoned because we have earth leakage relays is trading on very dangerous ground. Earth leakage relays and others have been known to fail and if there is no normal earthing then we have removed any sort of back-up protection that there could be for the earth leakage relay. I think this must be given very serious attention if there is any such thought.

Quizmaster: Thank you, Mr Plowden. Any other member with experience or views on earthing these replacement or new type of metal roofs?

J.G. Wannenburg (Department of Labour, Pretoria): Mr President, I'm by no means suggesting that if you have earth leakage protection for metal roofs that you should then do away with earthing. However, when you cable your power into the house then I see no reason for it.

R.B. Anderson (CSIR, Pretoria): Mr Quizmaster, as a matter of interest we did do some tests on the 'Harvey' tile roofs for the manufacturers and I'm sure that this has been made public. The sheets of these roofs are connected by the holding-down bolts passing through them in sufficient numbers. We found that the conductivity of the roof was adequate after it had been constructed and we made tests on several houses with these roofs and found they compared very favourably, for example, with old galvanised iron roofs. As far as earthing these roofs is concerned we suggested that this be connected to the guttering at intervals of the order of one length of guttering (approx. 3m) and that the guttering then be relied upon to earth the roof in that instance. That was the recommendation. How far this has been carried out I have no idea.

A.F. Turnbull (Vereeniging): I feel I can't let this question of the earthing of baths go unanswered. I can't see why you should think of earthing a bath

that/...

that is completely divorced from the electrical system and I think that you're only creating a hazard if you start bringing an electrical connection to a bath which is removed from the electrical installation as such.

Regarding the earthing of roofs, I feel that there are two important aspects: the one is, if you earth for lighting is it necessary to bond to the electrical system. The other is that if there is no possible chance of any electrical connection to a roof, why earth it?

H. Barnard (Brakpan): Mr Quizmaster, one brief point about which we have to be rather careful: if we do away with earthing altogether we will find ourselves with an earth leakage relay which is really useless because it operates on the principle of a leak to earth.

Quizmaster: Thank you, Mr Barnard. Well, gentlemen, I think we've discussed this question pretty thoroughly. It is something which should be discussed between the AMEU and the Department and as Mr Wannenburg has mentioned there is room for modifications. I think then that we can leave it at that.

Questions submitted by Messrs. G.E.C. - English Electric of South Africa (Pty.) Ltd.

(a) Standardisation: "Reference has been made to the desirability of Standardisation. What type of standardisation does the AMEU consider desirable? While fully accepting the necessity for performance and quality standards, we see grave dangers in the rigid acceptance of dimensional standards."

M. Coutts-Trotter (G.E.C. - English Electric of South Africa (Pty.) Ltd., Germiston): Mr Quizmaster, tomorrow afternoon the Bureau of Standards will be presenting a paper on "The Responsibilities of the Power Supply Engineer as regards Formulation of Standard Specifications". Our question, by sheer coincidence, involves the same subject.

We here today, the users and the manufacturers, must have standards and in many areas the specification of and insistence on performance and quality

standards/...

standards leaves much to be desired. The sooner we have Bureau standards for all the equipment the better, but when we meet to discuss these standards let us concentrate on quality and performance and not on an attempt to make all manufacturer's equipment interchangeable. Considerable items such as fuses, light bulbs etc. must, of course, be fully and completely interchangeable but surely we are going too far if we try, for instance, to make all the compartments of a miniature substation interchangeable. If we lay down a national standard in which the length, depth, width and fixing dimensions of a unit are determined, this is the way it's going to be manufactured for an awful long time.

The problem with this type of standardisation is that the manufacturer immediately loses his initiative to design a new model which might for instance save a third of the space or 20% of the cost. No manufacturer is going to take the risk of designing a new model and fight the Bureau of Standards.

There are some areas in which we have to accept the inhibiting effect of interchangeability requirements but it would be doing your industry and the South African export effort a disservice to insist on this without thought to future development possibilities.

Mr Quizmaster, I believe we've had enough to say on this and we are very interested to hear what the AMEU members think on the subject.

Quizmaster: Thank you, Mr Coutts-Trotter. Well, gentlemen, there you have one viewpoint: vive la difference! but standardise where it's really necessary. Could we have some discussion on this.

A.A. Middlecote (SABS, Pretoria): Mr Quizmaster, perhaps it will save some time if I speak now although the question is really covered in the paper tomorrow.

Everything can of course be overdone and on the other hand we don't always do things when we should do them. It is the duty of the Committee to decide when standardisation in the form of simplification is an advantage or not.

The benefits of simplification are undeniable because every solvent manufacturer applies it vigorously on his production line. If this can be carried into the general population to their advantage, it's a good thing. It's for the Committee to decide if it's restrictive and then you certainly don't go for standardisation.

A good example of this is that there can be no doubt as to the advantage of standardising at this stage of technology, the dimensions of motor frames. You still have the advantage of increasing your horse power within a given size so you're not really restricting in that sense and you obviously give the machine manufacturer the advantage of very easy replacement of a motor without having to buy an odd one and modify its mounting habits.

If, however, at a very early stage of technology you do put restrictive dimensions and thereby virtually not allow smaller ones to be made, this is indeed being a little foolhardy. However, in those cases I think you would find a sensible Committee would merely restrict the dimensions that are essential, shall we say where terminals come in or something like that.

All in all, it's really a matter for the Committee: anything can be overdone and vice versa. Thank you.

Quizmaster: Thank you, Mr Middlecote. Can we have the views of any municipal engineers.

E.E. de Villiers (Rustenburg): Mr Quizmaster, the matter of the standardisation of mini-substations was touched on by Mr Coutts-Trotter who mentioned specifically that he thinks it would be a retrograde step to standardise on dimensions. I think, however, there's a very big advantage for both the manufacturer and the user, within limits as has just been mentioned.

I can state, for example, that if I have a mini-substation of a certain manufacture and I have immediately available a different manufactured job which will fit, I won't then go to the expense and trouble of purchasing another one which does not fit.

This/...

This happens every day and so as far as I'm concerned it really is a very, very important point to consider. Thank you.

P.J. Botes (Roodepoort): Mr. die Vraesteller, dit is vir my nou regtig snaaks om van die vervaardigers te hoor dat hulle nie wil dimensies hê nie. Ek was op 'n spesifikasie waarop hulle aangedring het dat daar moet dimensies op wees anderste is dit nie 'n standaard spesifikasie nie! Nou wat moet nou gedoen word? (gelag en applous)

G.C. Theron (Vanderbijlpark): Mr Quizmaster, just let's take this question of house service meters. I wonder where we would have been if the dimensions of the fixing holes had not been standardised, but that didn't stop any manufacturer from developing new types of meters.

Talking of meters, the thing that puzzles me, however, is that the manufacturers didn't hesitate to standardise on the price at which they sell these to us! (laughter and applause)

Quizmaster: Well, gentlemen, it looks as if the discussion is really getting interesting now! Any further contributions? Not. Well, thank you very much. I think, as has been pointed out, this question is also covered by

Mr Middlecote's paper and we will therefore be hearing more about it tomorrow afternoon when doubtless there will be more discussion on the subject.

Question 1: Should installations be inspected when there's a change of occupancy?

I can already hear shouts of 'no' but let's hear why! (laughter)

P.J. Botes (Roodepoort): Mr. die Vraesteller, hierdie ene is natuurlik 'n baie duidelike 'nee' by Roodepoort en ek dink ek spreek namens almal hier. Ek kan dit net noem dat Roodepoort is maar 'n klein dorpie en ons het ontreut 16 950 aansluitings. Die frekwensie van die persone wat per maand van perseel ruil is ongeveer 300. Daardie 300 gebeur nie oor die hele tydspan van 'n nuwe maand nie maar slegs binne twee of drie dae. Dit maak plus/minus 100 per dag wat ons dus moet inspekteur.

Dan is daar natuurlik gewoonlik die bouers wat hulle huise normaalweg die laaste twee dae voor die end van die maand wil laat inspekteur. Dit bring die getal op omtrent 150 per maand, so ons het omtrent 150 huise per dag wat ons moet inspekteur teen die einde van die maand en die middel van die maand het ons geen werk vir die manne nie. Hierdie aangeleentheid kan ek dus net nie steun nie.

Daar is natuurlik die ander punt ook dat elke keer wanneer jy inspekteur moet jy 'n ordentlike rekordstelsel hê van elke huis. Nou daar is party huise en party woonstelle wat jy elke maand sal moet inspekteur en nou kan u dink hoe lank daardie rekord van sulke plekke sal wees. Dus, sou dit Roodepoort aanbetref, sal ons tot die laaste toe veg oor hierdie aangeleentheid. Dankie.

President (interjected): Gentlemen, the question is twofold: occupancy or ownership. I think with ownership there might be some merit in this. I have seen houses changing ownership in a terrible condition and the new owner has nothing to fall back on. I think, therefore, we must consider the matter very carefully before saying a decisive 'no' to this question.

A.H.L. Fortman (Boksburg): Mr Quizmaster, on this point: because of the large volume of change of tenancy and ownership I think this becomes just about impossible to carry out by inspectors in routine checking. I don't think this applies only on the Reef but must apply to most municipalities, so I think we must really rule this out.

Besides, Mr Quizmaster, what about houses that don't change tenancy in 40 or 50 years? Those will then never be checked and I think this is a point to consider. I would rather suggest that a routine house-to-house check be done. Whether this takes a year or even five is immaterial but in this way all premises would eventually be checked and not just those having a change of tenancy. Thank you.

Quizmaster: Thank you, Mr Fortman. Well, there we have the problem of peak loads or spreading the load and how it's done.

J.A. Loubser (Benoni): Mnr. die Vraesteller, wat Benoni betref gaan daar- die antwoord ook definitief 'nee' wees, maar wat mnr. van Ahlften se probleem aangaan, m.a.w. wanneer die huis van eienaar verander, kan die probleem mak- lik opgelos word. In Benoni doen ons dit deur enige mens te nooi om sy huis te laat inspekteer. Ek dink mnr. van Ahlften het in gedagte om die nuwe eienaar te beskerm, en indien so 'n eienaar by die Stadsraad laat aan- soek doen dan sal ons dit in elk geval vir hom kom inspekteer. Dankie.

I.H. Hess (Cape Town): Mr Quizmaster, our practice in Cape Town as far as houses are concerned is obviously very much the same as that stated here by other municipal engineers. However, we do find industrial and commercial people by far the worst culprits and whenever we get an application for supply for a new occupant of industrial or commercial premises, we do in- spect as we find this absolutely essential.

P.J. Botes (Roodepoort): Mnr. die Vraesteller, na aanleiding van wat mnr. van Ahlften daar gesê het wil ek net dit noem dat as ons gaan inspekteer wanneer die een persoon sy eiendom verkoop aan iemand anders gaan ons ons self, nie net van ons kant af nie maar van die eienaar versus eienaar, probleme om die hals haal en die wetlike aspekte daarvan sal so verreikend wees dat dit nie die moeite werd is nie. Lerlikwaar, ek het dit ondervind in Roodepoort.

D.A. Gardner (Kantey, Loteryman, Gardner & Anstey, East London): Mr Quizmaster, as you rightly said these are two different points. To use a hackneyed phrase, the first is one of those described as being very good in theory but impossible in practice. Previous speakers I think have fully outlined that point.

As regards the second point of the new house owner or changed house owner, it's common in large centres today, particularly with many of the Building Societies who will not advance money for the purchase of a property unless you have a borrower-free certificate as well as a certificate stating that the wiring of the house complies. This would cover that point quite adequately. Thank you.

K.G. Robson (East London): Mr Quizmaster, I think there's still an aspect of the supply industry service tied up with this. In East London we have for

some years now been testing installations on request. Since we're also in the business we are perhaps slightly mercenary in that we charge for our service and it's becoming quite customary now for us to inspect installations on behalf of agents and owners.

I believe this is a part of the service we shouldn't lightly discard as I think we have a responsibility in this regard which although not a legal one, nevertheless depends entirely on how you apply this. We haven't had the troubles, for instance, that Mr Botes appears to have had.

One would hesitate, of course, to advertise that we were going to inspect them all but I do think this is a service that only the electricity supply industry can give in the right kind of way.

H.C. Dreyer (Paarl): Mnr. die Vraesteller, die kwessie van inspeksies van installasies het basies twee beginsels. Die beginsel wat ek eerste wil noem is die ene wat meeste mense uit die oog verloor, nl. dat die verbruiker 'n verantwoordelikheid het om sy installasie volgens moderne standaarde en regulasies reg te hou. Die munisipaliteit behoort na regte eintlik net daar te wees in 'n adviserende hoedanigheid maar die verantwoordelikheid bly nog altyd dié van die verbruiker.

Die kwessie van inspeksie van huise wanneer dit van elenaarskap of huurder verwissel berus dus by hierdie beginsel. Ek voel nog dat die verbruiker behoort bewus gemaak te word van die feit dat hy self verantwoordelikheid moet aanvaar vir die huisbewoners en hulle veiligheid, en hy moet self optree om seker te maak dat daardie installasie veilig is. Dit is verkeerd om altyd die verantwoordelikheid op die elektriese ingenieur te gooi.

Die ander aspek wat ek wil noem is dat die munisipaliteit die kontrakteur wat draadwerk moet verrig moet rig, m.a.w. hy moet nie net die kontrakteur van advies verdien hoe hy die installasie moet doen nie maar hy moet hom ook kontroleer wat betref sy kwaliteit van werk en die veiligheid van die installasie. Dit voel ek is verpligtend op die munisipale ingenieur, soos dit ook gestel word in die Draadwerkerswet.

Om terug te kom na die eerste stelling: ek voel dat ons as munisipale elek-

tristiteitsondernemings gehelp kan word deur die Departement van Arbeid in hierdie opsig. Ek sal graag wou sien waar daar meer mense seerkry of verongeluk weens elektriese installasies, dat optrede baie ernstig oorweeg word teen die eienaar of die okkupant van daardie gebou in plaas van teen die elektriese ingenieur.

U weet die Paarl is 'n redelike klein dorpie maar ons het 'n groot aantal inspekteurs in verhouding met baie ander plekke. Ons het eintlik vier inspekteurs en gister toe ek 'n bietjie navraag gedoen het by meeste van die groot ondernemings was ek geskok om te hoor van die klein getalle inspekteurs wat hulle in diens het. Dit is absoluut basies onmoontlik om daardie werk van nuwe installasies te behartig met minder as vier inspekteurs en dan nog behoorlik inspeksies te kan doen.

As daar 'n ongeluk plaasvind is dit maklik vir die fabriekinspekteur om 'n ondersoek te kom instel. Hy vind miskien daar is 'n kragprop binne ses voet van 'n kraan af en die elektriese ingenieur is dan in die moeilikheid maar hy het net nie die hulpmiddele om daardie werk te verrig nie; maar daar word tog van hom verwag om verantwoordelikheid te aanvaar wat basies nie die verantwoordelikheid van 'n ingenieur is nie. Dankie.

Quizmaster: Dankie, mnr. Dreyer. Well, gentlemen, that's introduced another aspect, the responsibility of the individual.

J.I. Inglis (Pietersburg): Mr Quizmaster, Just to cap this I would like to remind our Association that this matter was considered very very seriously some years ago when our able friend, Mr Burger, was our legal adviser. He advised us very strongly against doing just this and I think if we were to check up on the old records we should find the whole of his summing up on this particular problem. Since he studied the matter very carefully in the interests of our Association we would do well to take heed of what he said.

E.E. de Villiers (Rustenburg): Mnr. die Vraesteller, in die eerste plek is ek baie skikkerig dat ons vriende, die geaffilieerdes, sal begin dink, soos ek al begin dink het, dat ons probeer ons verantwoordelikhede ontduik en ek kan amper die gedagtes lees van mnr. Wannenburg want hy het op verskeie kongresse

vir ons baie dringend gewaarsku omtrent wat ons eintlike verantwoordelikhede is en dat ons hulle nie kan ontduik nie.

Benewens dit glo ek dat enige munisipale ingenieur saam met sy stadsraad sterk verpligtings het teenoor sy inwoners. Hier is 'n wyse waarop ons

ons inwoners ook kan dien. Die verskil wat u gemaak het, mnr. die President, tussen die wisseling van eienaars en van bewoners is baie duidelik. Ek stem honderd persent saam: dit sal nie prakties moontlik wees om met wisseling van bewoners sodanige inspeksies te doen nie, maar waar daar wel wisseling van eienaars is waar tans geen inspeksies gedoen word nie, kan ek nie sien waarom die heraanskakeling wel gedoen kan word en die tussentydse inspeksies deur die loop van die maand nie. Ek kan nie dink dat enige stadsraad sal weier as 'n ingenieur na hulle toe gaan en vir hulle vra vir een, twee of drie bykomende inspekteurs om daardie veiligheidsaspek te dek nie.

Dan is daar die verdere aspek as 'n mens dink aan die baie nuwe dorpe, bv. soos Carletonville (waar ek 'n paar jaar was) is daar miskien baie minder probleme te vinde as in die ouer dorpe (Rustenburg is een van hulle) waar daar baie ou huise en installasies is wat probleme kan gee. Nogtans met die wisseling van eienaars glo ek u sal nie meer as 10% gevalle kry waar u taamlike kwaai eise gaan stel vir die verbetering van daardie installasie nie. Ek dink ook nie dat u kan betrokke raak in enige hofsake of moeilikhede van daardie aard as u bloot u plig doen soos neergelê in die Wet nie.

Mnr. die Vraesteller, ek dink ons moet dit baie duidelik verstaan dat ons nie ons verantwoordelikhede kan ontduik nie. Dankie.

P.J. Botes (Roodepoort): Ek is jammer dat ek nou vir 'n derde keer hier moet praat oor hierdie aangeleentheid maar dit is vir my 'n baie belangrike saak.

Mnr. die Vraesteller, in Roodepoort het ek jare gelede inspeksies laat doen op sekere baie ou gebiede - Maraisburg en 'n deel van Roodepoort-Noord - en al die installasies is deur die bank afgekeur en die mense moes van vooraf begin bedraad.

Eintlik is dit teen die wet; dis nie in die Wet neergelê dat roetine inspeksies uitgevoer moet word nie maar ons het dit gehandhaaf in Roodepoort.

Ons kom nou by die punt van finansies want gewoonlik het die mense in daardie ou gebiede nie die finansiële vermoëns nie en hulle moet dus gehelp word. Lenings moet aan hulle beskikbaar gestel word deur die munisipaliteit en dit is 'n baie belangrike taak veral op hierdie tydstip wanneer geld so skaars bekombaar is om noodsaaklike dienste te voorsien.

As 'n huiseienaar miskien voel sy bedrading is gevaarlik behoort hy na die munisipaliteit te kan kom om inspeksie daarvan te vra. Nog al die jare as ek my verslag aan die Raad stel maak ek melding daarvan dat Roodepoort se publiek nie eers bewus is daarvan dat die Elektriesiteitsdepartement vir hulle hierdie werk verniet doen nie. Ons is nie soos Oos-Londen waar hulle 'n footjie daarvoor vra nie!

So hier en daar kry ons iemand wat dit graag wil laat doen. Wat die wetlike aspek aangaan kom dit af op die punt van finansies. Verbeel u net u het nou net 'n huis gekoop en u het ingetrek maar u kan geen krag aangesit krye nie want die huis is geïnspekteer en afgekeur. U sit nou maar in die donker want u het net nie die geld daarvoor nie weens die baie geld so juis uitgelê op die huis self. Mnr. die Vraesteller, u kan seker verstaan waarin u uself gaan beland en mynsinsiens is dit net nie die moeite werd nie.

Quizmaster: Dankie, mnr. Botes. Gentlemen, I think we've had a very thorough discussion on this issue and I now call on Mr Wannenburg to sum up for us.

J.G. Wannenburg (Departement van Arbeid, Pretoria): Ek het bra lus, mnr. die Vraesteller, om vir mnr. Botes te sê: "You're telling me", want ek het in sy gebied gewoon vir 29 jaar en elke skoot wat ek iets daaraan gelas het aan my huis is Piet by om te kom inspekteer en dan kos dit vir my R30-00 of so om weer my aarding te laat regmaak! (gelag)

In ieder geval ek wil net 'n paar opmerkings maak. Hier is op verskeie maniere nou al verwys na die Elektrotegniese Draadwerkerswet. As ons die

definisie van bedrading lees dan verwys dit na herstel, toevoegings, ens. As ons na artikel 19 van die Wet toe gaan dan sê dit dat daar geen krag aangeskakel mag word voordat die besondere perseel geïnspekteer is nie, of die installasie op die perseel nie.

Daarvan kan 'n mens aflei dat dit net van toepassing is in die geval van nuwe persele of nuwe bedrading. Artikel 25 dié magtig die voorsiener om 'n elektrotegniese-ingenieur aan te stel om ondersoek in te stel binne sy magte maar net vir sover dit 19 onderafdeling (1), (2) en (3) raak.

As ons terugkyk na 61 van die Fabriekswet daar sê dit ook dat jy nie weer krag mag aansluit nie voordat jy vir aarding, ens. ondersoek het maar dit is net weer wanneer reparasies of toevoegings of so iets gedoen is. Ek gaan u nou skok want nêrens in een van daardie twee wette sal u vir my kan wys waar dit 'n ingenieur magtig om 'n bestaande installasie te gaan ondersoek nie! Dankie. (applous)

Quizmaster: Dankie, mnr. Wannenburg.

ADDITIONAL QUESTIONS RECEIVED FROM AFFILIATES FOR THE MEMBERS FORUM:

Question 1: "What is the attitude of smaller Municipalities to offering off-peak tariffs?"

E. de C. Pretorius (Potchefstroom): Mnr. die Vraesteller, in Potchefstroom het ons nou die afgelope tien jaar 'n buite-spits tarief. Dit was oorspronklik as eksperimenteel bedoel gewees en dit geld vir gebruik tussen 10nm en 6vm. Die minimum bedrag wat betaalbaar is per maand is R20-00, dat klein verbruikers nie daarvan misbruik maak nie.

Ons vind dat heelwat verbruikers daarvan gebruik maak veral in die laaste tyd met vloerverwarming en ons het nog geen probleme sover gehad nie. In Engeland 'n paar jaar gelede het die probleem ontstaan dat die buite-spits verbruik naderhand die spits verbruik van die dag oortref het maar ons het nog nie daardie probleem gehad nie.

Ons het natuurlik 'n bepaling dat die tarief alleenlik beskikbaar is indien dit nie nodig is om die sisteem vanwaar die verbruiker bedien word of waarby

hy aangesluit is, ten gevolge te versterk of te verswaar nie. Dis al wat ek te sê het, mnr. die Vraesteller.

K.J. Murphy (Cradock): Mr Quizmaster, we once had an enquiry from a bakery for an off-peak tariff which we duly arranged for this party, but they never got around to making use of it. However, if there are any other budding industrialists who would like to come and establish themselves in Cradock we'll certainly make a point of giving them off-peak tariffs! (laughter)

Quizmaster: Thank you, Mr Murphy. Of course you realise that it's R10-00 a minute for the commercial! (laughter)

J.A. Loubser (Benoni): Mnr. die Vraesteller, ons het ook so 'n buite-spits tarief wat hoofsaaklik net gebruik word in Benoni vir die kommersiële verbruikers vir winkelbeligting, ens. Daar is egter een probleem wat 'n mens daarmee het en ek noem dit net. Deesdae gebruik stadstesouriere almal kompers om hulle rekeninge uit te stuur en daarvoor wil hulle definitief net een meterlesing per verbruiker hê. Dit sal dus beteken as ons 'n tweede tarief in werking moet stel, dat ons nog 'n meter sal moet hê of ons sal 'n meter moet hê wat op 'n sekere tyd kan oorskakel intern na 'n ander meganisme toe, bv. 1 000 rewolusies per kilowatt-uur in plaas van 500, of iets van dié aard.

D.H. Fraser (Durban): Mr Quizmaster, I'm not sure whether you have a grudge against the larger municipalities or whether you simply feel they've had enough to say already in this meeting. However, the question of off-peak tariff must of course depend on the system-load characteristics and this will vary from one undertaking to another; those situated in the severe winter load conditions will have their own particular problems. Invariably, however, supply authorities do have a peak load problem of varying magnitude and there are definite advantages in trying to keep this peak load down.

One means of doing this is by offering tariff incentives and we have done this with quite considerable success in Durban with large industrial users.

There/...

There we offer an incentive to consumers to keep off the peak load by splitting the maximum demand charge into two parts and this, we are quite confident, has resulted in the very large and consistent improvement in load factor. Not that it doesn't bring us into conflict with industrial users who, while this is purely voluntary - they're not prohibited from using supplies over the peak period - nevertheless have to pay for what they use. This they don't altogether like but we do have general acceptance.

As regards the domestic consumer it may be said that they probably contribute very largely to the peak load. However, the application of a tariff to give them an incentive to reduce peak load is complicated by the additional metering costs that would be involved. The alternative of limiting load through a load-limiting switch has also serious disadvantages, so it would seem that on the domestic front you would have to resort to other means of reducing the peak load e.g. load control for water heaters or something of that sort. Thank you, Mr Quizmaster.

H. Barnard (Brakpan): Mnr. die Vraesteller, ons het ook 'n buite-spits tarief oorweeg. Dit neem gewoonlik 'n hele rukkie om dit te kan afkondig maar met elektriese en televisie net om die hoek het ons daarvan afgesien!

J.H. Hess (Cape Town): Mr Quizmaster, I'm encouraged to speak seeing that you allowed Mr Fraser from one of the larger municipalities to do so!

In Cape Town we've had an off-peak tariff for donkey's years, this being based entirely on the production costs at the power station and so being a very low tariff. Unfortunately our climate is not such that we can encourage much in the way of off-peak load and such things as floor-warming are not generally very popular. We do allow a two hour boost for industries during the afternoon from 2 to 4 but they cannot use it very often.

However, I would like to put forward a thought as far as domestic consumers are concerned, something which we are investigating in Cape Town at present. This is the use of the 'white' meter which has now been offered to a very large number of consumers in Great Britain. This is purely for domestic consumers and consists of a combined meter which changes over from the one

dial/...

dial to the other. In other words, there are two meters - one which measures daytime consumption and one the night-time consumption.

By increasing the day tariff and correspondingly reducing the night tariff you cause a tremendous saving of load from the day to the night even for domestic consumers. Washing machines and things like that are then used at night time only and I think this may have a lot of merit in helping us to get a better load factor on our systems.

Quizmaster: Thank you, Mr Hess. Well, gentlemen, we've had the views of some of the largest towns in the country, now what about the little 'plattelandse dorpie' that the question is really aimed at?

E. E. de Villiers (Rustenburg): Mnr. die Vraesteller, ek is baie bly om vandag te sê ek is nie meer van 'n stad nie maar van 'n dorpie dat u my nou kans gee om te praat! (gelag).

Mr Quizmaster, I'm rather surprised that my colleagues, the other municipal engineers, seem to have forgotten the tremendous advantages of reducing your demand. I'm not speaking about cities which have their own generation at this stage although the long-term advantages of this are excellent, but of people taking power in bulk from ESCOM. The immediate advantages can be terrific, and in most cases most definitely are. There are also long-term advantages which we are all aware of and I'm not going to elucidate now.

The point I particularly want to make is the great importance of having a tariff for increased load factor. I spoke to Mr Plowden of Johannesburg some time ago as they apparently have such a tariff and we are aiming at something like that for Rustenburg, particularly now with the development of our Border Industrial Area which is going to be a big incentive for industrialists. Perhaps Mr Plowden would give the meeting some details of their tariff and how they apply it as it is extremely interesting. Thank you.

Quizmaster: Thank you, Mr de Villiers. Gentlemen, I think we've had a pretty lively discussion but as time is running out and we still have to finish discussing Mr Eriksson's paper of this morning, I will now close the

Affiliates Session and hand over again to the President. (applause)

President: Gentlemen, it's been a very lively discussion and has proved very successful. I hope we'll have the same in future. Our thanks to Mr Martin for so ably taking the Chair. (applause)

Gentlemen, I think we should discuss the paper by Mr Eriksson further and before calling on Mr Middlecote to say something I'd like to call on Mr Frank of A.S.E.A. to give his comments as he is a manufacturer of cables and might be able to add something of interest.

L. Julyan (A.S.E.A. Electric S.A. Ltd., Pretoria): - speaking on behalf of Mr Frank - First of all I'd like to congratulate Mr Eriksson on his paper which I think he put over fairly well in the short time available to him.

Regarding Mr Barnard's query about jointing and terminating kits, I would like to say that these are available in the Republic, and you, Mr President, I think agreed partially with Mr Eriksson on this emerging new dielectric by stating the delivery times of cross-linked polyethylene cables in this country.

Briefly the history of this cable in this country is as follows: It was first produced in 1967 rated at 11kV and after five months of testing and developing of jointing and terminating techniques, the cable was then ready for marketing.

I would like to state here that the jointing and terminating techniques were tested in conjunction with the Bureau of Standards and reached roughly the 22kV impulse level of 150kV. The first installation of these cables was across the Vaal River for the ESC in 1967 and this cable is still in service.

The majority of municipalities in the Republic are now installing cross-linked polyethylene cables and are extremely satisfied with them. To date our estimate is that there is approximately 2 million meters of cross-linked polyethylene cable installed and energised in the Republic. There are both 22kV and 33kV installations and the one I'd like to mention in particular is one which has been in operation in Bulawayo for roughly two and a half years.

Gentlemen/...

Gentlemen, we agree with Mr Eriksson regarding the fault levels. To date we have had four which we have attributed to probable impurities in the dielectric.

We have available at the moment comprehensive papers delivered lately in the States analysing these previous reports, as mentioned by various speakers, on 'treeing' and the stators of cross-linked polyethylene, all of which prove that the design features of the cable are of prime importance. This is rather a lengthy issue to discuss right now but I shall be only too willing to impart this information to anyone who is interested. Thank you.

A.A. Middlecote (SABS, Pretoria): Mr President, I was originally not going to talk; I was going to leave it to Mr Prins but, on second thoughts, I would like to speak, particularly because it's been such a pleasure for me to listen to Mr Eriksson here today. Mr van Wyk will bear me out that I have been pleading with the CSIR for many years now to start this insulation Department. This is because there is no doubt that insulation is the foundation of your economic well-being in the electrical engineering industry.

This being the case, although he did so correctly from a scientific point of view, I should have preferred him to have put the economic factor as the most important factor in assessing insulation. Your best example of this is the reduction in the size of motors giving you the best value for money because by reducing the size you save on other materials if you can use a better insulating material.

The next important point is to make a quick assessment of whether it's good or not in the long run and this boils down to methods of test, particularly those concerned with what one could call life expectancy. Mr Eriksson has covered this in some detail but, briefly, there are 4 main categories of failure:-

- 1) intrinsic - almost immediate or due to something like impulse;
- 2) discharge - which may take anything from 5 to 6 years;
- 3) thermal degradation or chemical degradation - which is long term
- 4) environmental effects of some sort.

The/...

The IEC appreciate this and the sooner they can get some agreement on acceptable test methods on a material, the sooner we can give a direct answer as to whether something made from that material will be reasonable or not. This will come in due course but we have to be patient.

Actually the IEC has divided this into 3 sections: fundamental material, to which you apply certain requirements; incorporated into a system e.g. applied to a wire, a cable or a busbar; and, finally, used on apparatus. You might even have thermo-mechanical effects on the apparatus which can affect the insulation which might be extremely suitable on some other form of apparatus because it may not have the dynamic or other stresses.

We hope this will come soon as it will make things much easier. At the moment you can by certain methods of test in a laboratory assess whether a possible cable insulant will give a reasonable life and then if it is economically an advantage to make a cable of this, we go ahead and draw up a specification. But it is important to realise that it is extremely difficult to bring a new product on the market until you have an analysis of all these different mechanisms of fault.

I'm not arguing with either A.S.E.A. or Mr Eriksson as they could well be right in the long run. To give Mr Booth and others their due, you might have a low rate of failure up to say 5 to 10 years, after which you might find quite an increased rate. Not that I'm saying that this should hold up the works because after about 10 years you might find the longer-term mechanism which Mr Booth touched on, and one should not therefore be too conservative.

Take, for example, our motor design: in spite of our covering in specifications the class of insulation that should be used in terms of its temperature rise, some motors can be constructed to give a longer life than others. So it's inevitable that we will never be able to draw up a specification for a polyethylene cable and guarantee that it will give as long a life as a paper cable or vice versa. Someone has to take a commercial risk somewhere; we can only give you the reasonable life expectancy of such a cable.

Lastly/...

Lastly, Mr Prins and I have been picked out but we are watching polyethylene. We certainly haven't got enough information in South Africa to call a Specification Committee together to get specific answers. I think you'll agree no-one has any specific opinions as yet. However, in Athens in November they will be discussing internationally in ICEU the basis for a specification for polyethylene and I don't think it will be very long in coming after that. It's coming in its own time, though, as the relevant information is becoming available. Thank you. (applause)

MR SIDNEY: Thank you, Mr Middlecote. Any further discussion on this paper?

C. L. Cosser (Bulawayo): Mr President, I must congratulate Mr Eriksson on the very very full paper which has given me even more confidence in cross-linked polyethylene than I had before.

As has been mentioned, we've had 33kV cables (single-core) in commission for 2½ years and I see no reason why they shouldn't be there for the next 66 years as was mentioned for paper cables.

The remarks by Mr Prins and Mr Booth were somewhat alarming and might put a lot of engineers off using cross-linked polyethylene who would otherwise have been prepared to install it. Also, certain engineers are being very conservative in their attitude to the possible life of this cable.

I was privileged to see a rather comprehensive report on the failures that have been experienced in Japan recently and from the brief look I had it seemed evident to me that all the faults were due either to contamination in materials or bad manufacture. The answer there is that if one chooses one's manufacturer and buys from a reputable organisation, one is 90% sure of getting a good cable.

Everyone seems to be quite assured of the future of cross-linked polyethylene, or polymers generally, and I'm rather amazed at the conservatism of so many engineers in this country. Surely the only way to give these cables a chance is to try them out, and in my view, the municipal engineers and the supply undertakings are the only people who can really do so. I think in future people should try out these cables and let them develop from their experience

rather/...

rather than leave it all to the CSIR and the SABS who haven't really the facilities for trying them out in practice. Thank you.

PRESIDENT: Thank you, Mr Cosser. Well, gentlemen, there you have the positive approach. Any further discussion?

S.G. Hancock (Scottish Cables (S.A.) Ltd., Johannesburg): Mr President, I'd like to pick up one or two detailed points in Mr Eriksson's paper on testing.

There is no doubt that in these polymeric cables discharge is responsible for a lot of damage. It's quite conventional except that internationally you need an over-voltage test at $2\frac{1}{2}$ times your working phase voltage to ground. Unfortunately discharge usually supervenes somewhere in that voltage range. The draft international specification on these cables suggests that you don't need to go above $1\frac{1}{2}$ times the working voltage in order to seek out discharge but that certainly doesn't satisfy the demand for over-voltage testing.

I would suggest rather that DC over-voltage testing be considered as that dispenses with the corona discharge straight away in any voids which may exist.

On the multi-voltage Schering Bridge results given in Fig.17 in Mr Eriksson's paper I would like to know, firstly, what was the basis voltage (i.e. the system phase voltage to earth) that that was based on because that is more significant in relating the extent of ionisation to over-voltage. I would also point out that it is extremely time-consuming to carry out a long range of voltage tests on a Schering Bridge on multicore cables; it's practically prohibitive in the manufacturing context.

As regards environmental cracking, there seems to be a thought abroad that cross-linked polyethylene is less sensitive than straight polyethylene to this. I don't know that there is a great deal of grounds for that. Polyethylene itself is a mixture of an amorphous and a crystalline phase. Since cross-linked polyethylene is only partially cross-linked there is bound to be a residue of unlinked polyethylene present which can be susceptible to the

old bugbear of environmental cracking. It can persist but probably at a reduced level.

Treeing: both water and sulphide treeing, as the Japanese call it, is not yet fully explained. It's one of those defects which has cropped up more or less on a sequential basis. Originally it was environmental cracking and now treeing has occurred to discourage the development engineer. It is a matter which must be fully investigated and explained, which will no doubt happen in due course.

Treeing does raise the question of the solidarity of cross-linked polyethylene. Actually it's not a solid and continuous phase material at all because it's been shown that its strength can be improved by the injection of a silicone oil. It is therefore definitely a discontinuous phase material which may well assist the propagation of 'trees'.

That concludes my comments, Mr President. I'd like to hear Mr Eriksson's replies to some of them.

C. Lombard (Germiston): Mr President, I wonder if the author of the paper could tell us why EPR seems to be taking a back-seat to cross-linked polyethylene these days. At one time we heard quite a lot about EPR. In certain respects it has superior properties to cross-linked polyethylene, one of those being that it is more resistant to corona. Yet no mention was made of EPR this morning and I should be interested to hear the reasons for this. Thank you.

PRESIDENT: Thank you, Mr Lombard. Gentlemen, we will now call on Mr Eriksson to reply to the various questions put forward this morning.

A.J. Eriksson (National Institute for Electrical Research, Pretoria): Mr President, I find myself in a rather difficult position in that I'm not sure whether I should reply to the concept of the replacement of oilpaper cables by polymer cables or whether I should particularly support the introduction of polyethylene. I must emphasise, though, that in my paper polyethylene was introduced as an example of one of many new materials presently emerging and the emphasis of the paper wasn't directed entirely at supporting polyethylene.

However/...

However, I must particularly thank Mr Middlecote for his comprehensive review of the situation, particularly where testing is concerned. I like his emphasis on the role of over-voltage testing and am glad to hear of the prospects for improved specifications and standards here.

I would suggest that one of the reasons for the earlier failures experienced with polyethylene has been that these cables, whether polyethylene or cross-linked polyethylene, have been put into service and have been made to undergo tests based on earlier specifications for oilpaper type cables at rather higher over-voltage levels than are recommended for these types of materials. This has quite definitely been found to be a contributing factor on the Continent and in the United States. So the prospect of more enlightened over-voltage test levels and test procedure is very welcome.

Taking some of the points in turn: this question on Fig.17, the loss tangent curves, was in that part of the paper which was concerned with the general concept of assessment techniques and was not specifically an example for polyethylene cable; it was based on curves for high voltage motor stators which were designed for 11kV.

I do agree that one of the more difficult problems as far as polyethylene cables are concerned is the question of field testing of these cables. In principle I think maintenance testing is an excellent idea but at the moment I will certainly admit that there is no real satisfactory test procedure for field testing of these cables. Laboratory testing and routine type testing during manufacture is another story; but the assessment of these cables under field conditions is extremely difficult and I think there's room for a lot of development here.

As far as EPR is concerned, I did mention this very briefly and again must emphasise that polyethylene was chosen as an example; the choice being based on the observation that in the United States and Japan and on the Continent, as well as in other countries, there are cumulatively hundreds and thousands of kilometers of these cables in service and have been for a good few years.

The failure rates are very low and, as pointed out, in the United States, for example, over 90% of cable faults in these cables have been due purely to 'dig-in' type faults and not to intrinsic or even manufacturing faults.

I feel that polyethylene as a material offers tremendous potential for cables - and the fact that we are still in a rather adolescent stage in the application of these cables is more a consequence of the fact that manufacturers are still encountering problems in their manufacture. The fault does not lie in the basic material; it lies in the application of the material into the system and in the design of the cables themselves, and this is something that is still being resolved.

Coming back to EPR, I agree this offers quite a few advantages. It does have a better discharge resistance; it has better handling and flexible properties than polyethylene and one alternative that has been tried quite successfully is a blending of EPR with cross-linked polyethylene. In this way you combine the higher discharge resistance and greater flexibility of EPR with the better electrical characteristics of the polyethylene - the lower loss and higher stress factors.

I would suggest that one approach we could follow in this country where users are putting these cables into service, is that where these faults do occur, they be brought to the notice of the Bureau of Standards or the CSIR, for example. We can then investigate these and possibly gain a lot more information as to the factors involved in the service application of these cables.

I am particularly grateful for the discussion we have had here today as I think it has been very informative and it has been very interesting to see the reaction to this paper. Thank you, Mr President. (applause)

PRESIDENT: Gentlemen, I'm sure you will all join with me in thanking Mr Eriksson for presenting a very excellent paper and also the CSIR for making all this information available to us. I think the timing has been perfect as far as the paper is concerned; it's set everybody thinking; it's given us more information and it's given the Bureau more scope to work with. We look forward to hearing much more of this in the future. (hearty applause)

Having announced that a telegram had been received from Mr S.T. Collins of Intali apologising for his absence which was brought about by the recent hijacking of an aircraft, the President then adjourned the convention for lunch.

AFTERNOON SESSION (Thursday, 25th May, 1972)

President: We come now to the second half of the days proceedings i.e.

REPORTS OF REPRESENTATIVES AND SUB-COMMITTEES

Mr D.C. Plowden commented on the Report on the TRAINING OF TECHNICAL STAFF as follows: Mr President and gentlemen, I haven't got very much to add to the report as published in the Proceedings except to report that out of the 136 questionnaires sent out we have received 54 back, making a return of about 40%. This might be regarded as quite a good return but for the kind of information we wanted it was rather disappointing.

The Committee dealing with this has been fairly active in following up with the Witwatersrand College of Advanced Technical Education on the possibility of basic training centres being set up if not by the AMEU and its member undertakings, perhaps by the Technical Colleges themselves. However, I can say nothing more about this at this early stage.

Mr Plowden proceeded to discuss the ELECTROLYTIC CORROSION COMMITTEE on which he was the AMEU Representative, saying: there was no report from this Committee in the Proceedings because it normally meets only once a year and I reported fully on their activities in Cape Town. However, I have recently had a communication from Mr Cousins, Chairman of the Witwatersrand Area Electrolytic Corrosion Regional Committee, saying that it has become apparent to this Committee in dealing with electrolytic corrosion metricated measures, that there are many municipal engineers in the area covered by this Committee who are not aware of the fact that such a committee does exist and that the AMEU is represented on it. He has asked me to bring this fact to the attention of the engineers present. Mr Dawes of the Johannesburg Electricity Department is the AMEU Representative on this particular Committee and he can be contacted on Telephone No. 8363601 or by post at Box 699, Johannesburg.

In addition, Mr Cousins says that his Committee plans to send a circular letter to all municipal undertakings in the area covered by his Committee and also that they will request the main Committee to arrange for a suitable notice to be inserted in the Government Gazette. Thank you, Mr President.

Report on the SOUTH AFRICAN BUREAU OF STANDARDS

A. NATIONAL/...

A. NATIONAL STANDARDISATION

P.J. Botes (Convenor): I do want to add a few things to the Report, Mr President. 'n Standaard Praktijk Instruksie is opgestel as 'n handleiding vir verteenwoordigers van die SABS subkomitees. Dit het voortgespruit uit die versoek van die Hoëveld-tak en is gister oorweeg met die uitvoerende Komitee. Voorsiening word gemaak vir die daarstelling van werkgroepe in die verskillende takke en die terugvoering van inligting na die SABS. Hierdie Standaard Praktijk Instruksie sal eersdaags aan alle verteenwoordigers beskikbaar gestel word, asook aan alle takke vir inligting.

'n Ander aspek is dat verlang word dat die verteenwoordiger en alternatief die vergaderings van 'n subkomitee bywoon, maar dat verteenwoordigers van individuele dorpe of stede wegval behalwe waar sulke persone deur die SABS gekoöpteer word.

U sal onthou dat daar by die konvensie in Kaapstad seker probleme opgeduik het in verband met die transformator spesifikasie. Daarna is sekere skrywe gerig deur die SABS, maar nieteenstaande blyk dit dat eenvormigheid nog nie bereik is nie en sekere instansies is nog ontevrede oor die aangeleentheid. Ek onderneem persoonlik, mnr. die President, om met mnr. Middlecote en die betrokke instansies te skakel om al die probleme uit te styk.

Verder wil ek net my dank uitspreek aan die verteenwoordigers vir hulle harde werk gedurende die afgelope jaar en die hulp en bystand verkry van die SABS, asook aan mnr. de Villiers en Plowden vir hulle steun. Dankie.

PRESIDENT: Mnr. Botes, ek let net op uit u verslag onder „Elektriese Yskaste en Voedselvriesers" dat mnr. Heunis van Standerton daar aangetoon word. Dien hy nog op die Komitee want hy is nou mos die Stadsklerk van Standerton?

P.J. Botes (Roodepoort): Ek is jammer, mnr. die President, ek dink dis 'n drukfout wat daarop verskyn. Die nuwe ene is mnr. M.W. Odendaal, Alberton en die alternatief, mnr. Len Fatcher.

PRESIDENT: Dankie, mnr. Botes. Mr Middlecote, would you like to contribute to this report?

A.A. Middlecott (SABS): Thank you, Mr President. I should like to thank Mr Botes for the interest he's taking and all he is doing to try and rationalise this.

I would also reiterate that apart from the alternate turning up to some of our committee meetings, we are even prepared, provided you can find the time, to have more than one representative on relevant specifications on which you particularly feel you have a big say. This might help continuity a bit more.

There has been no international work done since the last meeting which is why there is no report on that but I have recently come back from quite an important meeting of TC64 and you might be interested, in view of the discussions this morning, in the thought which is now gaining control throughout the world.

Firstly, there is a tendency in most countries to assume that there is no such thing as an earth-free situation. In other words, they accept the fact that there is always an earth available and have therefore undertaken to phase-out lightly-insulated appliances which used to conform to what was known as Class 0; these to be used only where it could be guaranteed that there is no available earth point for anyone to touch. This is going to be rather important.

The other interesting point is that it has now been agreed upon that the world can standardise on one socket outlet and two plugs. So there will eventually be only 3 classes of appliance in the future:-

- 1) the double-insulated or equivalent appliance which has a second line of defence should the insulation break down; to be used with the two-pin plug;
- 2) the type of appliance that has to be solidly earthed to be used with the three-pin plug;
- 3) special low voltage exceptions which will be rare.

There will be one form of socket which will be used throughout and it only remains now to reach agreement on the dimensions of these, which is a far more difficult task. However, the very fact that we've achieved this much

is an incredible achievement. Thank you.

PRESIDENT: Thank you, Mr Middlecoote. Any further discussion on this report? I wonder if perhaps Mr van der Merwe could give us some more information on the document prepared for Core Balance Earth Leakage Protection.

F.J. van der Merwe (Carletonville): Mnr. die President, die eerste Komitee Vergadering het gesit in die verband en hulle het die oorspronklike dokument in besonderhede bespreek. Daar is nou 'n werke-komitee saangestel om die dokument weer na te gaan.

Sever dit die integrale eenhede betref was daar taamlike wye verskil gegee in die betrokke komitee, en daar is toe gevoel dat die spesifikasie uiteindelik sal moet voorsiening maak vir albei eenhede - integrale sowel as los - en dat verskeie ondernemings deur middel van hulle plaaslike verordeninge sal moet voorsien om integrale eenhede af te dwing as hulle dit so verkies. Dis al wat ek kan rapporteer, mnr. die President.

PRESIDENT: Dankie, mnr. van der Merwe. If there is no further discussion on this, gentlemen, then we'll proceed with the Reports.

Mr D.C. Plowden (Representative) had nothing to add to the Report on the "CO-ORDINATING COMMITTEE FOR HIGH-VOLTAGE RESEARCH AND TESTING FACILITIES"

REPORT OF THE RECOMMENDATIONS COMMITTEE FOR NEW ELECTRICAL COMMODITIES

E.W. Barton (Convenor): Mnr. die President, ek wil net verskoning vra dat die Afrikaanse vertaling hiervan ontbreek. Dit was eintlik na die drukkers toe gestuur maar het blykbaar spoorloos verdwyn. Verder het ek niks om by te sit nie, dankie.

REPORT ON S.A.N.C.I. CONGRESS 1971

Mr R.W. Barton (Representative) apologised for the numerous errors appearing in the English transcription for which he took responsibility, and he went on to congratulate Mr Conradie for the excellent job he had nevertheless made of the Afrikaans version.

REPORT ON WORLD ENERGY CONFERENCE

E.W. Barton (Representative): All that I can add is that the increase in fees from R40,00 to R50,00 per annum will have to be sanctioned.

PRESIDENT: Thank you, Mr Barton. Is there any discussion on Mr Barton's reports?

E.E. de Villiers (Rustenburg): Mr President, I think we should thank this Committee for the comprehensive list of their work over the past 20 years which they have compiled and sent to all the members. I have found it a great help.

PRESIDENT: Thank you, Mr de Villiers. We would certainly like to thank the Committee for that information as it is very useful.

Report on the REVISION OF THE STANDARD REGULATIONS FOR THE WIRING OF PREMISES

E.E. de Villiers (Representative): In die eerste plek wil ek net 'n misverstand uit die weg ruim. Vele mense het vir my aangedui, veral by die Kaapse Kongres, dat hulle baie teleurgesteld is dat die SABS die baba oorgeneem het van die Bedradingsregulasies en dat daar nou niks gebeur nie. Die SABS mense, veral mnr. Grant, was baie beskeie maar ek kan vir u sê hulle het geweldig baie werk gedoen, aanvoer werk. Mnr. Grant was oorsee in verskeie lande om navorsing te doen. Dan was daar ook die uitsortering van werk wat tot op daardie tydstip gedoen was deur die Nasionale Komitee, TK.64, om vir ons die regte basis te gee om op te bou. Op hierdie stadium wil ek hulle hartlik dank vir die harde werk en die goeie leiding wat hulle gee by die vergaderings.

Soes u sal oplet is ek ook nou een van die mense wat help om die „eselswerk“ uit te sorteer in die werkgroepe. Tydens my tweede verslag het daar nog net een werkgroep as sodanig bestaan. Die werkzaamhede van die werkgroep is nou verdeel om die hou van notule ens. te vergemaklik. Werkgroep 1 dié hanteer basies al die stukke van TK.64 en Werkgroep 2 het dan hulle basiese doel om die regulasies te hersien.

Sedert die verslag wat ek uitgebring het, het albei werkgroepe alreeds weer vergader en Werkgroep 2 vergader nou weer volgende week. U kan dus sien dat

ons laat die bal nou taamlik vinnig rol. U moet maar net 'n bietjie geduld gebruik want ons probeer ons bes, en met die groot hulp van die SABS sal die saak nie lank sloer nie.

Mnr. die President, miskien sal een van die SABS mense iets wil byvoeg. Hulle mag dalk iets in gedagte het wat van belang sal wees vir die lede hier. Dankie.

PRESIDENT: Dankie, mnr. de Villiers. Mr Grant, would you like to add something to this report ?

J.V. Grant (SABS): Thank you, Mr President. May I just say thank you for that short report from Mr de Villiers.

PRESIDENT: Thank you Mr Grant. Any further discussion on this report ? Mr de Villiers, for our information will this Practical Handbook for General Use and Wiring Practice come out before the General Handbook ?

E.E. de Villiers (Rustenburg): Mr President, the idea is that we want to give the practical man, let's say the contractor, something in his hand first because that will be of much more use to us as power suppliers; another reason being that the more comprehensive manual will take much longer to complete, perhaps up to four or five times as long. The practical manual will therefore definitely receive preference although to a certain extent they will run more or less hand in hand. However, I think one can say that the practical manual will come out very soon as compared with the other one.

PRESIDENT: Thank you, Mr de Villiers. We will now proceed with the Reports.

FINALE VERSLAG OOR GEMEENSKAPLIKE DIENSGERIEWE

G.C. Theron (Verteenwoordiger): Mnr. die President, ek wil eintlik niks byvoeg by die Verslag nie. Dit is maar 'n afsluiting van die werksaamhede van die Komitee. Maar ek merk in die Forumvrae, eintlik wat môre gaan dien, die volgende vraag: "...Is daar enige onderneming wat besonderhede kan verstrek soos dit die praktiese toepassing betref van gemeenskaplike diensfasiliteite ?"

Dit is natuurlik 'n baie wye vraag en ek weet nie of dit prakties moontlik

sal wees om so 'n vraag te beantwoord môre nie. Daarom wil ek net aan die vraesteller stel dat indien hy probleme het, kan hy met my in verbinding tree want ons is al die laaste twee jaar daarmee besig en miskien kan ek dan sy probleem vir hom by wyse van privaat bespreking oplos. Dankie.

PRESIDENT: Dankie, mnr. Theron. Ons sal môre sien as ons by die vraag kom of daar enige iets verder bespreek kan word. Is daar nog kommentaar ?

D.H. Fraser (Durban): Mr President, this document has now been issued as the Report states, by the UME through its Provincial Association to the various local authorities. The stipulation made, in putting this forward to the local authorities, is that its acceptance is dependent on it causing no financial or other burden on local authorities. Of course it is inevitable, however, that some burden will devolve on local authorities in the administration - if not financial - but here we must presumably consider this in relation to the possible overall benefits to the community.

Then there are two points in the Code which I think are perhaps a little premature in anticipating changes which might not have come about yet. The one is the reference to the GPO Requirements being specified in the Wiring Regulations - these are the GPO Requirements in Clause 14 .2.2 of the Code. However, there doesn't appear at this stage to be any provision in the Wiring Regulations in this respect.

The second is a reference to the amendment of the Post Office Act. I'm not aware whether this has yet been enacted. Could Mr Theron give us some information on this please.

G.C. Theron (Vanderbijlpark): Mr President, regarding the first question, I ascertained from Mr Eggers from the Post Office about a month ago that he had had discussions with the Bureau of Standards in this connection but apparently this has not been finalised yet; the idea being that some guide be given in these Standard Regulations of the indication of the Post Office Requirements. This would obviously be to the benefit of the owner because by complying with these requirements he would then make the installation of his telephone at some future date very much easier. So although this has not been finalised as yet it is hoped to include it in

the new publication.

Regarding the amendments to the Post Office Act, I speak under correction but I think Mr Eggers indicated in Cape Town that this was being considered in conjunction with the connection fee for Post Office connections which is now being enforced. It is being carried further but as you know amendments to the Act take a long time - even longer than our Standard Regulations! Thank you, Mr President.

M.P.P. Clark (Newcastle): Mr President, the meeting might like to know that Mr Eggers was at Newcastle about a week ago and it is not anticipated that this amendment to the Act will take place this session of Parliament but well at the next one.

J.V. Grant (SABS): Mr President, this matter was discussed by the Wiring Regulations Committee and was referred to the Working Group which Mr de Villiers mentioned in his report. At the moment this has not been finally discussed but there is some doubt as to whether this should in fact be in the Wiring Regulations at all. If it is included it is more than likely to consist of a note to the effect that for Post Office connections an enquiry should be made from the supply authority as to whether there is anything in their jurisdiction that requires the putting in of telephone facilities. I don't think we could lay down Post Office Wiring Requirements as such.

Mr de Villiers was to have brought this up with the Executive Council and it's been left in abeyance now until our next meeting on Tuesday next week.

PRESIDENT: Thank you, Mr Grant. Mr de Villiers will convey the decision of the Executive Council taken yesterday to this Committee.

Report on the C.S.I.R. ADVISORY COMMITTEE FOR ELECTRICAL ENGINEERING

J. von Ahlften (Representative): Gentlemen, this is my Report. I didn't attend the last meeting of this Committee because of ill health but compiled this report from the annual reports of the CSIR. However,

I would like to thank Mr Theron, on behalf of the AMEU, for all the very valuable work he's done on this Committee for many years.

I don't know whether Mr Anderson or Mr van Wyk would like to add something to this report.

J.D.N. van Wyk (National Institute for Electrical Engineers): Baie dankie, mr. die President. Ons wil natuurlik van ons kant af ook net weereens ons dank uitspreek vir die samewerking wat ons van u organisasie kry. U weet dit is ons beleid dat ons navorsing doelgerig moet wees en veral toegespits moet wees op die soort van probleme wat uniek aan Suid-Afrika is. Dit is dus alleen deur samewerking van persone soos uself, en die bywoning van hierdie soort besprekings dat ons dit moontlik kan doen.

Then, Mr President, I would like to clarify something about Mr Eriksson's paper this morning and that is that we get nothing out of this from the polyethylene people! You may be wondering, in fact, what we're paying Mr Middlecote because instead of Mr Eriksson getting his head chopped off he only had his hair ruffled, whereas Mr Middlecote took quite a few blows below the belt, for which I thank him!

In more serious vein, Mr President, I was impressed by the discussion we had on this paper. It is this very interchange of views that we are looking for.

Finally, I would like to add that as you pointed out in your report, this is but one of the facets of the work we're doing in our Institute and our doors are always open to anybody from this organisation who would like to pay us a visit to see some of the other things we're doing or to have individual problems solved.

Thank you very much. Perhaps Mr Anderson would care to add something.

R.B. Anderson (National Institute for Electrical Engineers): Thank you, Mr President. On this question of research objectives and research projects I seriously think that your organisation is one of the largest fields

of know-how in regard to where research should be undertaken in the electrical industry and I personally look very much to your organisation for guidance in these projects.

There are two routes by which any research can be initiated - one is directly through our Advisory Committee where your representative attends and can voice the opinion of your organisation regarding particular aspects of research which should be undertaken. This I am sure you will take full advantage of.

The other route is via the working groups and the High Voltage Co-ordinating Committee for Research and Testing Facilities. This is a CSIR committee and its objective is to co-ordinate research in the various fields. This Committee meets twice a year and here again you can mention research projects. It also has two working groups now - the one under Professor Hallawell which deals generally with the insulation field.

I note you mentioned that cable insulation should be added to what they are already doing. Any research can be brought up by your representative there and put under way.

The other working group deals with pollution and external insulation. Mr van Alphen of the Bureau of Standards is the Chairman and is leading the group on what research requirements are needed in the pollution field.

Unfortunately your member was not able to attend the last meeting of the Co-ordinating Committee held in Cape Town. This was a technical meeting, so to speak, at which we saw what is being done in the pollution field in that area. We were very impressed indeed with Escom's testing stations where they are looking at the pollution from sea air conditions on all types of insulation and fittings as well as corrosion problems; and also the University of Cape Town where they are specifically interested in this subject. Mr van Alphen was able to give us a comprehensive talk on all the problems regarding not only sea pollution of insulators but pollution by industrial effluents and so on.

This working group is there for your convenience and any help that you can contribute towards the work of this Committee will be very much appreciated.

We/...

We look to you to tell us where the fields of investigation are most needed. Since you haven't a research organisation of your own, we in the CSIR are there as a service to your organisation. Thank you, Mr President.

PRESIDENT: Thank you, Mr Anderson. I think following on from Mr Eriksson's paper you've got a field of investigation right on your doorstep - cross-linked polythene cables!

If there is no further discussion on this, we will proceed with the Reports, gentlemen.

ANNUAL REPORT 1971 ELECTRICAL WIREMEN'S REGISTRATION BOARD

J. von Ahlften (Representative): I would like to point out here, gentlemen, that the termination date of the concession the Board made to give professional registration to practising wiremen who had the necessary experience has fallen away as from 31st January, and we can prepare ourselves for very stringent inspections by the Department of Labour.

The other point is that the amendments to the Act have all been compiled and sent through to the Secretary for Labour. The idea is to re-circulate all these comments or proposals received. These will then get the attention of an AMEU sub-committee which will report back again. That's all I have to say at this stage. Perhaps Mr Wannenberg would like to add something.

J.G. Wannenberg (Department of Labour): Mr President, you've already mentioned the termination of the concession that we made. I'm pleased to say that as from about November last year we had as many as 295 applicants for registration at a single meeting as compared with about 60 per meeting in the past.

We've made a further concession which really just amounts to a logical way of applying the Act as far as apprentices are concerned. Once they've completed their apprenticeship and passed sufficient of the examination we can give them provisional licenses immediately. We prefer, however, that

they/...

they do one year's approvalship, as mentioned in the Act, after which they then apply for provisional licenses.

We are fortunate this year in having no less than five people present here able to advise you on these matters; on the Wiring Contractor's Act, there is you, Mr President; there is Mr Tom Leff, Principal Inspector of Machinery in Johannesburg; there's Mr Dalton who is attached to the Pretoria Office; there's Mr Hare who is attached to COTT's Training Centre and, naturally, too there is myself. So please feel free to avail yourself of the five people present here today. Thank you.

PRESIDENT: Thank you, Mr Wannenberg. Any discussion on this report?

H. Barnard (Brakpan): Mnr. die President, op bladsy 43 staan daar geskryf: „Die geskrewe eksamens is by 46 eksamensentra gehou 1 334 kandidate was daarvoor ingeskryf. Die uitslae was as volg: ...” Die totaal van Deel 1 en Deel 2 is 1 334, maar is daar nie van die kandidate in Deel 1 wat ook Deel 2 geskryf het nie? Dit sal dan beteken dat die totaal kandidate wat ingeskryf het minder is alhoewel die eksamens wat daar weergegee is, die totaal is.

PRESIDENT: Dankie, mnr. Barnard. Hierdie statistieke het natuurlik die Departement van Arbeid aan ons verstrek en soos ek dit hier vertolk verwys dit net aan die kandidate wat of Deel 1 of Deel 2 moes doen. Ek het nie die syfers self nagegaan nie. Miskien sal mnr. Hare van Olifantsfontein die verduideliking kan gee.

L.H. Hare (Olifantsfontein): Mr President, the written examination for the Board is in two sections and they count, as far as we're concerned, as two separate examinations. Candidates may be required by the Board to enter for both sections or either section independently; and if one candidate writes both sections, it's counted, for statistical purposes, as two examinations. Thank you.

PRESIDENT: Thank you, Mr Hare.

A.F. Turnbull (Vereeniging): Mr President, I want to relate an incident

that/...

that occurred with two of our apprentices that were called up for their compulsory trade test. As it happened they also received their call-up papers for military training and the position was that if they passed the trade test they were virtually out of a job because we let them go when they finish their apprenticeship. Whereas if they failed their apprenticeship they were still in our employ and the Council paid them. Needless to say, they failed hopelessly and we had someone down investigating the reason for this.

These are problems associated with the attitude of apprentices generally today.

PRESIDENT: Thank you, Mr Turnbull. I believe we all suffer with the same problems. Any further discussion on this?

Gentlemen, we've reached the end of the Reports with some time in hand. There was a request that some discussion time be allocated to the question of the concentric neutral cable which seems to be giving problems in coastal areas. Mr Prins I believe would like to give us some information on this type of cable in other areas.

F.J. Prins (SABS): Mr President, thank you for this opportunity. We are at the moment in the process of bringing out quite a big amendment to SABS 150 caused by the practical implementations of the metric cable specifications. One of the new types we have incorporated in the new metric specification, which was not in the old 150/1957, is the split concentric neutral type which has become quite popular in certain areas in Great Britain; essentially as a more economic form of cable as compared with the conventional 3- or 4-core armour type.

This type of cable has been used by a number of municipalities, amongst others Durban and Pietermaritzburg, for a couple of years now. Both these towns have experienced problems with this type of cable, which would apparently indicate weak mechanical design. On the other hand, it may be due to installation practices.

We have also come across problems in the conversion to metric especially

on the 16 sq.mm and 25 sq.mm sizes. Our biggest problem is that we don't know how many municipalities are using this cable other than Durban and Pietermaritzburg and, if any, what their experience with it has been. We would very much like to have a feedback of information on this as soon as possible because there are important aspects of this amendment which still have to be finalised. In the meanwhile we are holding the whole issue back.

I'm sure Mr Hancock of Scottish Cables would like to follow up on what I've said here.

S.G. Hancock (Scottish Cables (SA) Ltd., Johannesburg): This is quite a substantial problem, Mr President. There are three sections of the amendment of SABS/1950 : the first is the provision of an earth continuity conductor in the armour layer; the second is the implementation of control and switch panel type wire for railway signalling purposes; and the third is this aspect of the split concentric cable. Everybody is agreed on the first two amendments which industry is very anxious to get publicised and to put in hand, but we are held up on the split concentric question. Naturally the Bureau of Standards wants to bring all three matters forward together if at all possible.

I was under the impression until quite recently that the troubles that we have had in Durban and Pietermaritzburg might also be reflected elsewhere in the country and I raised this question in my capacity as Chairman of the Technical Sub-Committee of the Association of Electric Cable Manufacturers. I was horrified to learn, though, that two of the other manufacturers of this type of cable in the Transvaal had had no feedback of any sort on service experience either good or bad.

I would suggest here that I'm asking this Association to help the cable industry in turn to help them by giving us as much information as possible as to whether defects have occurred in service, their nature, frequency and so on. We can then look rationally at this design and make some positive and viable recommendation.

As it stands at the moment the specification is defective on the 16 sq.mm

and/...

and 25 sq.mm sizes because the dimensions produce an unstable cable. We have, in fact, already rectified this from a manufacturing point of view because otherwise we couldn't make and sell the cable, but whether this is a satisfactory result or whether it is adequate to increase the physical dimensions of an unarmoured cable, is at the moment for us an open question. I should therefore like to get a positive feedback as soon as possible from the members of your Association. Thank you, Mr President.

PRESIDENT: Thank you, Mr Hancock. Could we hear from Durban on the problems they have experienced with this cable.

D.H. Fraser (Durban): Mr President, as has been mentioned, the problems that we've had have I think been mainly due to the weak mechanical construction of this cable as compared with the conventional twin, 3- or 4-core cable.

We've had quite a number of problems which have led to rather unusual conditions. On one occasion one of these cables was damaged on a pole. This was a service connection off an overhead line into a consumer's property and the damage had caused the live and earth cores to short-circuit - the earth concentric conductors to short into the live - with sufficient resistance at the source of the fault not to blow the 60 amp pole fuse. Burning had taken place until the fault had burnt clear but it left the earth conductor leading onto the consumer's premises still connected to the live. The result of this was that the watermains and other earthed metal in the consumer's premises became live.

We had a similar fault in a joint on one of these cables which was actually attributable to poor workmanship. Other damage has resulted in trenches because the cable, which looks very much like the black PVC waterpiping, is easily damaged with a spade.

Those are the sort of troubles that we've experienced. Thank you.

PRESIDENT: Thank you, Mr Fraser. Is there any further information from

other/...

other users of this cable which could throw some light on this subject ?

A.P. van Skalkwyk (Bloemfontein): Mr President, are you referring to the Solidal type of cable with the concentric neutral and three cores ?

F.J. Prins (SABS): Mr President, the cable we're discussing has a central phase partly surrounded by lightly insulated neutral conductors individually insulated, then bare earth conductors, covered by an overall sheath without any armouring. In effect, you've got a three-phase cable with three equal conductor areas.

A.P. van Skalkwyk (continued): That's a new one to me, Mr President. You will remember at the Potchefstroom Technical Meeting we spoke about the problems we had experienced with the single-core concentric cable with the neutral on the outside.

Since then we've had a few cases of the heavier Solidal cable suffering from the same effect as the small concentric type of cable due to the outer sheath being damaged and some or other chemical action attacking the neutral conductor and eventually breaking through to the phases. It seldom blows a fuse but by some or other arcing action it gets worse and worse until eventually one phase burns off completely and only then do you realise there's something wrong on the cable. In one case this action drilled a neat hole about 3" in diameter from about 3' down in the ground which looked almost as if it had been bored into mechanically.

I'm not sure whether this is relevant to the subject we're discussing.

PRESIDENT: No, it's a different cable altogether, Mr van Skalkwyk.

A.F. Turnbull (Vereeniging): We have used a considerable amount of this small concentric service cable and our experiences were generally much the same as those of Durban especially on overhead lines.

A further problem was the workmanship at the terminations of the lightly insulated/...

insulated neutral and the bare earth. We found that the electricians were inclined to make a very untidy job of it with loose connections resulting. I would suggest that if this is to be pursued, that some thought be given to the terminations.

PRESIDENT: Thank you, Mr Turnbull. This is a general complaint, I think, in regard to this type of cable.

D.H. Booth (Scottish Cables (SA) Ltd., Pietermaritzburg): Mr Prins referred to the fact that this cable has been in use for some time in the United Kingdom and it may therefore be useful to your Conference, Mr President, to hear the general problems that have occurred in that country. In fact they follow a very similar pattern to those which Mr Prins has raised today. He was, incidentally, completely correct in saying that the motivation for using this cable was entirely an economic one.

About a year or so after the cable was introduced one particular Area Board complained of a very large failure rate due primarily to mechanical damage problems of the nature we've discussed. The first reaction was that this must be an isolated situation and that everybody else was getting away with it, but, in point of fact, it was soon recognised that a very similar order of trouble was occurring throughout the country, and that this particular Area Board's recording system was rather more aware than the others.

Consideration of the specification then took place and the conclusion was reached that any marginal improvement in mechanical characteristics was not likely to serve any useful purpose. The basic motivation being, as I said, economic it boiled down to the question of whether to take this economic advantage despite the possibility of a greater failure rate. As a matter of fact, this cable is now being used by 80% or 90% of people in the United Kingdom and they are simply accepting the fact of a higher failure rate as a matter of course. Thank you.

PRESIDENT/...

PRESIDENT: Thank you, Mr Booth. Would you like to add anything further,

Mr Prins ?

F.J. Prins (SABS, Pretoria): Mr President, it's a question of getting this amendment through as soon as possible because of the other two amendments involved which are quite important.

The answer we really want at this stage is: do we just correct for the geometry of the design in this amendment and then leave it open to the user to decide whether it's worth it as a calculated risk to use a frailer cable than the conventional armour type ; or do we increase the mechanical properties, which then negates the whole idea of it being a more economic cable than the armour type.

PRESIDENT: Thank you, Mr Prins. It would appear to me from the problems experienced in Durban that the mechanical side of the cable needs attention more than anything else but, as you rightly said, this then diminishes the economic advantage of this cable.

It is apparent then that this Convention can throw no more light on the problem at this stage and that you will have to make do with the information you have at hand.

F.J. Prins (SABS, Pretoria): It would help us very much, Mr President, if we could establish from the members here which other undertakings are using this cable to any extent to enable us to contact the people concerned.

It transpired from a show of hands that the following undertakings had the cable in use:

Mbabane Swaziland, Port Shepstone, Durban, Ladysmith and Estcourt.

THE MEETING WAS THEN ADJOURNED FOR TEA

LATE AFTERNOON SESSION (Thursday, 25th May, 1972)

PRESIDENT: Gentlemen, there appears to be considerable confusion as to the exact type of cable we were discussing before tea and I am going to call on Mr Prins to enlighten us on the subject.

F.J. Prins (SABS, Pretoria): First of all, Mr President, SABS 150/1970 (the Metric version) introduced the split concentric neutral cable that was evolved in Britain. This is based on copper conductors and is a standard 3-core cable where the phase conductor forms the core, and the neutral and the earth are arranged in a concentric layer around it, covered withall with an outer PVC sheath. In other words, it is a simplified 3-core cable. The specification allows for five different sizes, the most popular sizes being those normally required for service connections.

Then you have the concentric neutral cable which is also used quite a lot especially overseas. Here the phase core is surrounded by the neutral in the shape of a tape or wire armouring. This we allow in copper but not aluminium because of the danger of the outside sheath getting damaged and soil-water getting in and starting corrosion - the very trouble that Mr van Skalkwyk has been having in Bloemfontein.

I want to make it quite clear that these are two different cables - the one is a concentric neutral which is a two-conductor cable with the neutral arranged as a concentric armour around the phase; the other is the split concentric neutral cable which is a simplified 3-core cable and it is this one that we want the additional information on.

A further point has arisen in this connection and I would therefore like to clarify one of the other amendments to 150 that is coming through.

This concerns the improved conductivity of the armour wire especially in sizes above 16 sq.mm. In cases where the impedance of the armour wire is not adequate in the case of faults there are various ways of rectifying this, the simplest and easiest of which is to replace some of the steel armouring wires with copper wires. This we are now incorporating in the specification by way of an amendment.

I hope I have made myself clear now, and that there are no more uncertainties.

PRESIDENT/...

PRESIDENT: Thank you, Mr Prins. It appears to me that everyone is now quite clear on what you meant there.

Gentlemen, before proceeding with the Natal Branch Session I would call upon you to stand for a few seconds silence in memory of the late Mr M.N. Kirberger of Bethal who died last week.

NATAL BRANCH SESSION

PRESIDENT: Gentlemen, I will ask Mr K.W.J. Halliday, Chairman of the Natal Branch, to take over this session and introduce the various questions which have been circulated amongst you.

K.W. Halliday (Quizmaster): Thank you, Mr President. I must admit that we of the Natal Branch are conscious of the honour of being the first of the branches to take over the Forum.

Question 1 Referring to unbalanced 3 phase motor currents caused by Asymmetrical Voltages, as this effect becomes more pronounced in the case of motors fully loaded, has any member tried to balance the voltages by using resistors, etc.

This fact seems to arise mainly on the end of long lines where you might have a 3 phase distribution high tension line and you then get single-phase tapplings off a rural electrification. Can members offer advice here.

J.L. McNeil (Kokstad): Mr President, I struck this problem when the duty of our centrifugal pump was altered. The characteristics were altered too, of course, by trimming the impellers but nevertheless the load rose considerably to practically full load.

Unfortunately at Kokstad the MV network is completely and entirely interconnected and the cost of separating it into various zones would be prohibitive. Except for probably 6 or 7 service connections they're all by underground cable, so it's extremely difficult to try and balance the load evenly.

I checked the motor, the starter, the individual transformer that supplies

this/...

this particular pump at the end of an overhead feeder and I eventually was convinced that it could only be the asymmetric voltages. I checked these and found a variation of slightly over 2%. I even went as far as to trace it right back to Escocm and found that they also had a slight asymmetry in the voltages.

I quote now from a paper read in December 1958: "Fifteen percent unbalance in motor currents sounds like something very unusual but surprisingly it takes less than 2% voltage unbalance on a motor operating at rated load to cause 15% unbalance in motor current".

In the motor I'm speaking about I found that there was a 13% unbalance which was just sufficient to overload one phase.

It continues: "Three percent voltage unbalance will cause nearly 25% higher current in one line and that means 56% overheating of one motor winding and voltage unbalances of serious magnitude we encountered all too often".

I have not yet tried a resistor but I mean to do so first of all in the MV side. One peculiar feature was that although I could do nothing to alter this, as a last resort I changed the connections over on the secondary side of the transformer and that reduced it to slightly over 6%.

I might just mention that the majority of transformers installed at Kokstad are star-interconnected style but, of course, that only compensates for out of balance up to a certain extent. Thank you.

K.W.T. Halliday (Quizmaster): Thank you, Mr McNeil. Has anybody anything further to add to that?

D.H. Fraser (Durban): Mr Quizmaster, this seems to be a problem peculiar to Natal. In fact, we seem to be on our own quite consistently today!

This is something we have encountered on the Durban system and which has caused us problems with some big motor installations. The extent of the

unbalance current that results from what one might regard as only a moderate voltage unbalance is something which is surprising until you think about it. I should like to quote some figures from readings that were actually taken in practice. These are the phase voltages - red, white and blue.

No load voltage conditions:

233V 238V 232V

Currents drawn were:

23,4 26,0 15,0

Under full load conditions:

233V 237V 231V

Currents drawn were:

44,4 43,2 31,8

The basic cause of the voltage unbalance, as has been mentioned by you, Mr Quizmaster, is the unequal loading on the high voltage system. It is surprising how, with the extension of the system and the connecting up of new power transformers on an overhead high voltage distribution system, consistent use has been made by the artisan staff concerned of the easiest wires on the pole to make the connections. So, over the course of years, the voltage unbalance on the circuits has become quite significant. The solution to the problem lies in rearranging the connections to get a better balance of current in the high voltage system, and this is the line that we have been pursuing. Thank you, Mr Quizmaster.

QUIZMASTER: Thank you, Mr Fraser. Are Natal the only people that run their induction motors at full load? (laughter) If nobody has any more ideas on the subject, gentlemen, then we'll pass onto the next question.

Question 2. Due to the shortage of skilled labour, have members employed

non-white/...

non-white Artisans and/or apprentices and, if so, could they please comment on the pros and cons of this.

In Natal, as you know, we have quite a heavy preponderance of Indians who are very keen to get into the trades. As a matter of fact there are a number of Indian wiring contractors in operation and I have found them to do very good work indeed. However, we would like to know if any of you have thought of employing them in their own departments and of possibly training apprentices in their own departments, especially where they can be used in the areas of their own race group. What are the difficulties and/or advantages in this?

A.H.L. Fortman (Boksburg): Mr Quizmaster, we have, of course, one or two wiremen in the native areas and this I think is common to quite a number of municipalities. However, recently my Council appointed a Coloured electrician to work exclusively in the Coloured township. He is being paid a salary slightly less than the European artisans and to date we have had no friction. This only happened a little while ago so I can't comment much further at this stage. Thank you.

I.H. Hess (Cape Town): Mr Quizmaster, up to about 10 years ago in Cape Town we trained our own Coloured apprentices. These came in very useful in so much as our distribution system is divided into districts and one complete district was staffed entirely by non-Europeans. Incidentally, in Cape Town we pay them exactly the same salaries as we pay the Europeans. Then, unfortunately, we were stopped but as from 3rd January this year we have started our own Apprentice School in which we are now training Coloured apprentices with Europeans. We managed to get the approval of the Department of Labour for this, as well as that of our Staff Association, which was much more difficult to obtain.

The idea is that we can use these people in the very extensive Coloured housing estates that are developing in Cape Town. I sincerely hope, furthermore, that before they pass out that we will be able to use them everywhere.

What/...

What I think is of particular interest are the following figures. In December last year we called in the Press for European and non-European youngsters to come and serve their apprenticeship with us. We got 252 applicants of which 220 odd were non-European; 60 of these were matriculants, 50 odd had written matric but had not yet got their results and the lowest standard offered was Standard 8. Of the 29 European applicants we got one very long-haired St. 9 youngster that we didn't take, we got no St. 8's and the rest were all 7's and 6's.

What is even more significant is that after five months I asked the person in charge of this Apprentice Training School how these youngsters were getting on. We have ten of each and his reply was that if he were to place them in order of merit the first ten places would go to the non-Europeans. Thank you, Mr Quizmaster.

J.A. Loubser (Benoni): Mnr. die Vraesteller, ek weet nie of mnr. Fortman nou nou heeltemaal waargepraat het nie want ek het onlangs 'n elektriese gekry vanaf Boksburg wat by my kom werk het!

In elk geval, mnr. die Vraesteller, ons het die probleem op Benoni op heeltemaal 'n ander manier aangepak. Ons het begin deur te probeer uitvind hoekom ons nie meer vakleerlinge kan kry wat wil vir Benoni kom werk nie. Laat ek nou eerlik wees, in my opinie is die tekort aan ambagsmannebra omdat ons nie meer vakleerlinge daarvoor in die ambag kry nie.

Die Raad van Benoni het toe besluit om 'n salaris te betaal soortgelyk aan dié wat 'n man sou kry indien met St. 8 of matriek die skool verlaat en bv. in die bank of iets van die aard gaan werk. Ek is bereid om vir u hierdie salaris te noem al sê u dis fantasties. Dit kom egter daarop neer dat 'n vakleerling met St. 8 begin op R1 500,00 'n jaar. Hy kry salarisverhogings van R300,00 'n jaar en sy maksimum is R3 000,00. 'n Vakleerling met matriek begin met R1 800,00 'n jaar met ook 'n maksimum van R3 000,00.

Vandat ons hierdie skemas in werking gestel het - hierdie salaris-gradering - het ons ses Blanke matrikulante aangestel as vakleerlinge en twee St. 8. Dit lyk dus vir my asof hierdie ding dadelik begin vrugte afwerk want nou

kry ons ook vakleerlinge wat, op die oog af, beter gaan presteer as die vakleerlinge wat net St. 8 gehad het.

Verder, of u my wil glo of nie, het ons geen tekort aan elektrisies nie. Ek dink ook ons moet ontslae raak van die idee dat 'n vakleerling 'n onproduktiewe artikel is en dat ons hom moet dra. Hy kan produktief wees net so vinnig in die ambag as wat hy produktief kan wees in die bankwese of 'n winkel, waar hy ook eers 'n opleidingstydperk moet deurgaan. Dit gaan baie goed met ons daar en ek is baie tevrede daarmee. Dankie.

R.E. Friede (Electricity Board, Mbabane Swaziland): Official policy in Swaziland is that only Swazis may be used as trainees and technicians. We have to do this and we've had very satisfactory results. In my Department there are only a few Whites.

Training the men, though, has been a major effort and it always will be. We do find that we get our very best results from men who've had at least St. 9 or equivalent but there are a few exceptions. There is admittedly quite a lot of wastage but in hindsight this is often seen to be bad selection.

There are so few skilled tradesmen that the men have to learn by watching others, often not getting experience in a particular sphere for a long time and thus refresher courses have to be run quite often. However, on the whole our results are very satisfactory.

D.H. Fraser (Durban): Mr Quizmaster, I think it must be generally accepted that it is absolutely vital that we should make use of the labour that is available in this country in all categories and particularly to strive to have members of particular race groups serving their own community as far as possible.

We have launched a scheme for the training of Bantu electrical workers who will be trained in all spheres of a distribution undertaking's requirements. We have found, though, a reluctance on the part of the White artisan to undertake the duty of training these people and it has been necessary to

provide/...

provide some incentive to them. We are shortly going to embark on a similar scheme for the training of Indian apprentices. There is one aspect arising from Mr Hess's comments that does bother me a little and that is the possibility that a similar thing will occur in the electrical trade as has done in the building trade, in that this may come to be regarded as a job for the non-White and we might experience greater and greater difficulty in recruiting White apprentices. I think it will always be necessary for us to have a fairly good proportion of White artisans particularly in the more complex work that we undertake. Thank you.

C. Lombard (Germiston): Mr Quizmaster, we started training Bantu electricians some years ago the reason being that we found our European electricians reluctant to work in the Bantu townships, particularly at night, and I must add that this has proved an unqualified success.

As there are no facilities at the moment for Bantu apprentices to attend technical colleges we draw them from one of the training centres; in other words, those who've already had some theoretical training. First of all we take them on as trainee wiremen and then after they've obtained their wiremen's licenses we give them some training on the system where they work under the supervision of Europeans. Mr Hare will bear me out that these Bantu trainee wiremen have had considerable success in the examination for a wiremen's license. Also, the Europeans are very happy about this because it means that we've been able to create supervisory posts for them. In fact we've now reached the position where the Bantu attend to practically everything except serious system disturbances at night for which they have to call out the supervisors.

However, the reports we get from them are always very clear and the handwriting is legible which is more than can be said for many of the European artisans.

We are also now creating positions for Bantu electrician charge hands and in this way I think we have made it possible for these people to perform a good service in their own areas. No doubt later on they'll be able to assist in the development of the Bantu Homelands. Thank you, Mr Quizmaster.

J.A. Loubser...

J.A. Loubser (Benoni): Mnr. die Vraesteller, ek wil vir u ook noem dat in ons Bantudorp in Daveyton gebruik ons ook Bantu elektrisiëns. Hulle word eintlik opgelei as draadwerkers met groot sukses. Ons het daar Blanke personeel wat in beheer is van hulle maar hulle doen in werklikheid al die installasie-werk en teetswerk vir ons.

Die Raad het ook besluit om in die Indiër dorpsgebied 'n pos te skep vir 'n vakleerling Indiër draadwerker. Al probleem wat ons nog daar het is om 'n draadwerker te kry om dié vakleerling te kan oplei, maar ons het al baie aansoeke van Indiërs wat belangstel in hierdie pos.

L.H. Hare (Central Organisation for Trade Testing): Mr Quizmaster, from a purely interest point of view five years ago the two candidates with the highest marks in the Practical Examination for the Wiremen's License were Bantu. Also, I have been informed by the Apprentice Supervisor in the dockyard at Cape Town that 80% of their intake of apprentices last year (with ministerial approval) were non-Whites.

Actually there has been a phenomenal increase in the number of apprentices in certain trades in the last few years as regards non-White apprentices. Unfortunately I haven't got the figures with me as I didn't come prepared for that. I would like to say, though, that the pass mark in the case of non-Whites is as high as that of White candidates for the Electrical Wiremen's Registration Board Practical and Written Examinations; and in the case of the Bantu it is probably a little bit higher. Thank you.

QUIZMASTER: Thank you, Mr Hare. Well I think that covers the question pretty well, gentlemen. It seems to me very much as if we've got to try and find some way of maintaining the interest of the White youth in entering the trades, especially the electrical trade. We are trying to establish some method which will appease the White trades-union but at the same time be a benefit to the society as a whole. Thank you all very much for your comments.

Question 3. (dealt with in the Affiliates Session)

Question 4/...

Question 4. Regulation 711D of the Standard Wiring Regulations pertains only to Machine Control Gear and Resistances. Do members not feel that this provision should apply to ALL installations possibly by the addition of a Clause in Reg. 201 to state that all live parts should be so guarded as to prevent inadvertent contact with them.

E. de C. Pretorius (Potchefstroom): Mr Quizmaster, I think this aspect is adequately covered by many other regulations. I only need to mention Reg. 712A (i), 21851 (d) etc.

J.V. Grant (SABS, Pretoria): Mr Quizmaster, Reg. 711D says, "all live parts shall be so guarded so as to prevent any inadvertent contact with them".

This is obviously a regulation which applied generally to all live parts. We are not trying to define here what a 'live part' is as this can lead us into quite a bit of trouble. However, the Wiring Regulations Committee that is drawing up the new regulations is fully aware of this necessity and it will be incorporated as a fundamental principle for all parts of an electrical installation, so there is no need to worry about it. Thank you.

QUIZMASTER: Thank you, Mr Grant. That covers it in one fell swoop.

J.G. Wannenburg (Dept. of Labour, Pretoria): Mr Quizmaster, all that is covered in Reg. C53 of the Factories, Machinery & Building Work Act.

QUIZMASTER: Thank you, Mr Wannenburg. We stand corrected.

Gentlemen, that then disposes of that question and we're glad to hear from Mr Grant that this is going to be elucidated in the Revised Edition.

Question 5. As troubles are sometimes experienced on Overhead Lines due to the breaking of stay wires or stay rods, have the members who have experienced this trouble found any satisfactory method of overcoming the corrosion of wires or rods?

This question came really from Mr Waddy who, as we know, unfortunately cannot be with us today. They have experienced trouble with stay rods corroding through as a result of electrolysis and want to know whether any members in the electrolysis area have found methods of protecting their stay rods and plates from this corrosion angle.

L. Fitcher (Kempton Park): Mr Quizmaster, there is one satisfactory means of overcoming this that I have found and that is to replace your overhead system with an underground one! (laughter)

E. Trautman (Lady Smith): We've had no trouble with our stay wires because we put insulators inbetween. This cures the corrosion effect because you need the return path of an earth to bite on your metal.

QUIZMASTER: We've still had the stay rods go, Mr Trautman. The insulator is only taken from the earth wire on the overhead line. I should imagine that Mr Waddy's stays are insulated.

E. Trautman (continued): The point is, though, if you put the insulators in the stay wires they must surely not be connected to any earth besides the local earth. Escom does the same thing with their transmission lines where they isolate their towers from the earth wire and have local footing earth so that there is absolutely no electrolytic path possible. If you do this with your local stay on the pole you get exactly the same effect.

QUIZMASTER: Thank you, Mr Trautman. I'll put that to Mr Waddy when he gets back into circulation.

Question 6. With the coming introduction of Television, what knowledge have any members of possible interference with reception by overhead lines. This possibility is hindering the obtaining of servitude and way leaves for overhead lines.

A.A. Middlecote (SABS, Pretoria): First of all, Mr Quizmaster, there will be regulations under the Post Office Act limiting such interference, so it would be policed to a degree. Actually it's purely a matter of design and our Escom friends will tell you that they are already busy designing their overhead transmission lines to ensure that they won't interfere with television.

The only additional trouble that can arise is that from a faulty insulator to which will cause a little discharging to take place. Thank you.

QUIZMASTER: Have our friends in Rhodesia had any such troubles by any chance?

D.H. Fraser (Durban): Mr Quizmaster, since we haven't got television as yet the only problems we have so far are the potential ones in our own minds and the troubles the landowners are giving us is trying to pin us down to certain safeguards and guarantees in respect of interference levels.

I am reassured by Mr Middlecote's comment that if the design of the line is right then we've got no problem at all. However, I would like to ask him whether the distance from the line is not a significant factor in the answer he's given. We in the congested areas are conceding to property owners the right to build within servitudes and it is anticipated that there will be houses actually underneath the transmission lines. Under these circumstances, is the problem of interference increased or can we reassure these people that they are in no worse a position than those outside the servitude?

A.A. Middlecote (replied): Mr Quizmaster, it's all a matter of normal high frequency propagation laws. It will obviously be slightly stronger nearer the line than it is some distance away. It would decrease with distance but not very significantly within the distances Mr Fraser is thinking of. Thank you.

QUIZMASTER: Thank you. I think the ESC will recall the numerous complaints they used to have on the South Coast regarding interference with radio reception despite all the laws and design and what have you. Has anybody got anything to add to this?

I think we'd better all consult Mr Middlecote afterwards as to the lines along which future systems should be designed!

Question 7. On the operational side, is any experience available on heat shrink joints and terminations.

I.H. Hess (Cape Town): Mr Quizmaster, as we didn't receive the questions before arriving here I have unfortunately no figures with me from which to quote. We, however, first learnt about the uses to which one could put heat shrinkable tubings about five years ago when we sent one of our engineers overseas. We had to battle for a very long time to get manufacturers even to supply us but we eventually did persuade one company to import these. We have used them very very extensively on such things as terminations of service cables on the poles and in the houses, 11kV joints and covering ferrules and we have had no adverse reports at any time from within the department. Correctly used they serve a wonderful purpose.

E.E. de Villiers (Rustenburg): Mr Quizmaster, I'm just wondering why this question was actually posed. Have the manufacturers any reason to feel that we might be dissatisfied?

QUIZMASTER: Have any of the affiliates anything to say on this?

R.C. Foxcroft (Dowson & Dobson Ltd., Johannesburg): This is not a commercial but I'll just tell you in broad terms something of what we and our competitors are doing. On the heat shrink side we've been pushing the jointing systems for low voltage cables and we've extended the high voltage field. We have got terminations available now at quite high levels.

We/...

We, however, are a little conservative in that we only go to 11kV. These seem to be very good and we have a lot of them in service. In fact, a number of engineer members here today are using them but they seem singularly quiet about it which rather worries me!

Actually it's purely a matter of design and our Essex friends will tell I can say this, though, that by using the right techniques in the development of the joint or termination, it is perfectly good. The only possible problems are those caused by the operator not doing his job properly. As with any system it is the human element that finally determines the outcome. However, what both we and our competitors have achieved so far certainly does bode well for the future for this kind of material in all applications—cross-linked polyethylene, PVC and also the paper-leads.

We have been developing into the Triple E cable where, as with any aluminium conductor, it has to be completely watertight, and this is possible using a heat-shrinkable material. Thank you, sir.

E.A. McWilliam (Pretoria): Mr Quizmaster, we've only been using the heat shrink sleeve for about a year in Pretoria for all house service connections from the overhead mains and we've had no trouble so far. But a year's experience, of course, is not very much.

QUIZMASTER: That's the feeling we had too, Mr McWilliam, and that is why we wanted to know if anybody had used it for a longer period.

M.J.W. Chappell (Port Elizabeth): We've tried the heat shrink type of outdoor termination on 6,6kV under conditions of fairly severe pollution using cross-linked polyethylene cable made-off in the way it is suggested, as well as the resin type of termination and they've all failed within a year. Thank you.

QUIZMASTER: Thank you, Mr Chappell. That's what we feared.

K.G. Robson (East London): I thought you might be interested to know, Mr Quizmaster, that we've been using heat shrink terminations on cross-linked

polyethylene/...

polyethylene for transformer loops in substations. We use them on the transformer end and it is very neat and effective and gives us an insulated substation with a boot over the crutch. The indications are that they will be successful.

QUIZMASTER: How long have you had these in?

K.G. Robson (replied): Not so long - 6 months I should think.

QUIZMASTER (quipped): Well, keep your fingers crossed then! (laughter)

D.H. Fraser (Durban): Mr Quizmaster, as you have indicated the high voltage field is the one in which we're treading a little carefully and in Durban we have a number of trial installations on which we hope to build up experience in this field. In the low voltage field I don't think there's any particular worry from a technical point of view. There's no reason to believe that these will not stand the test of time and there are definite economic advantages to be had over the conventional cable box. This is contributed to by the fact that the cable box manufacturers have not increased their prices in fair proportions in some cases. I'll quote you some figures to indicate what I mean:

On a low voltage termination (i.e. up to 185 sq.mm) the current price for the conventional cast-iron, outdoor box is R52,00 as compared with R10,00 for the heat-shrinkable tubing method. Naturally, too, there is a big saving in the labour involved.

On the high voltage terminations the material costs of the heat-shrinkable kits are much higher than on the low voltage, as one would expect, but in most cases the pure material costs are lower in the conventional termination of the cable box.

However, in one particular type of switchgear, the cable box was quoted at a price of R79,00; the heat-shrinkable termination in that case being much cheaper at R35,00. Here again the time taken to effect the termination is very much less, so that in most cases, I would say, the heat-shrinkable

method is economically comparable to the conventional method.

There is one important advantage, I would say, in having this material available and that is that under breakdown conditions, where the time to effect repairs is of importance, the heat-shrinkable termination is a tremendous advantage because you don't require the cooling times associated with compound-filled cable boxes. Thank you.

QUIZMASTER: Thank you, Mr Fraser. Gentlemen, the point is that we in the smaller municipalities depend on the larger municipalities, who can afford it, to provide information gleaned under test conditions. It would seem, then, that it is all right with low voltages and does save on the time factor where high voltages are concerned but there is still a problem with the latter in conditions of heavy saline or pollution.

Question 8. As there seem to be variations in the laying depths of cables, do members not feel that a standardisation of depths may reduce cable faults from damage during excavations by other services.

K.R. Robson (East London): What I like about the Natal Branch is the confidence they have in our ability to dredge up these figures from our memories on the spur of the moment!

It might be of interest to you to know what we're doing in East London, Mr Quizmaster. We've standardised now on 1 050mm for 33kV cables; 750mm for 11kV and LV cables and 350mm for streetlighting and service cables. These lengths are to the tops of the cables. For HV cables we use concrete slabs.

QUIZMASTER: Thank you for those figures, Mr Robson.

P.J. Botes (Roodepoort): Mnr. die Vraesteller, by my het ek gevind dat daar is nie 'n diepte wat jy hom kan lê nie. Jy kan hom ses duim lê ; jy kan/...

kan hom twee voet lê of jy kan hom tien voet lê, maar as die siviele ingenieur hom wil opgrawe, dan grawe hy hom op! (gelag)

E.E. de Villiers (Rustenburg): Mnr. die Vraesteller, ek het 'n baie interessante gebruik gevind toe ek destyds in Bloemfontein gekom het en ek het gedog mnr. van Skalkwyk sou miskien vir u daarvan gesê het. Daar bestaan 'n vaste komitee van die departemente van die munisipaliteit wat doenig is met ondergrondse dienste tesame met die Poskantoor, wat gedurig al hulle probleme uitstryk. Hulle het natuurlik met die loop van tyd metode van aanpassing op die ou dele van die stelsel voordat koördinasie bestaan het, om standaard posisies en dieptes van kables te hê. Op hierdie manier is daar dan minder gevaar dat jou kables beskadig gaan word. Die komitee natuurlik dié hanteer ook sake waar enige een van hulle ter enige tyd opgrawings gaan doen, dat hulle vooraf met mekaar onderhandel.

In Rustenburg het ons 'n soortgelyke stelsel wat tussen die stadsingenieursdepartement en my departement opgestel was. Ons het heelwat wysigings daaraan gebring toe ons nou 'n tydjie gelede ook by die Poskantoor begin koördineer het; veral ook met die oog op die legging van gesamentlike dienste.

Ek dink nie dit is moontlik dat 'n mens hierdie saak kan standaardiseer deur die provinsie of deur die land nie, want jou omstandighede in elke instansie wissel so geweldig. Soos ek kortliks gesê het, 'n mens moet in aanmerking neem die posisies van jou ou dienste voordat jy sodanige koördinasie gehad het, sodat jy nie te veel afwyk en naderhand heeltemaal in die moeilikheid is nie. Die belangrikheid daarvan kan 'n mens nie oorbeklemtone nie. Jy moet daardie koördinasie hê in die vasstelling van die dieptes. Dankie.

C. Lombard (Germiston): Mnr. die Vraesteller, ek dink die idee van 'n standaard diepte van kables is uitstekend, maar uit die praktiese oogpunt sal ek graag wil weet hoe ons ooit hierdie ideaal gaan bereik. In die praktyk word jou kables gelê in nuwe dorpsgebiede lank voordat die paaië gemaak word of die finale oppervlakte vasgestel word. Na 'n paar jaar kom

die stadsingenieur en hy maak sy paaie en sy sypaadjies. Daarna vind jy in party gevalle jou distribusiekaste halfpad onder die grond begrawe of anders steek hulle bo by die grond uit. Ek sal dus graag wil weet van al die vorige sprekers, hoe hulle hierdie probleem oplos, om hierdie ideaal te bereik. Dankie.

E.C. Lynch (Salisbury): Mr Quizmaster, the last few speakers have been treading on very dangerous ground in that they seem to imply that by putting the cables at a standard depth they will help to prevent damage. Now the law states that it is the person that digs the hole that is responsible for the damage and you should not do or say anything which would seem to imply that you are accepting some responsibility for his damage to your cable. Therefore we shouldn't talk about standard depths, but rather recommended depths.

Clearly it is the responsibility of the man who is going to dig in the vicinity of your cable to come and see you and ask where the cable is. If he then damages your cable you've no worry, you can recover from him. Incidentally, when he does ask you should only give him the position the cable is believed to be in without being absolutely precise. In other words, warn him that you have cables in the vicinity and that it is his responsibility not to damage them. It is essential that you are absolutely clear as to where the responsibility lies and you should be very wary of departing in any way from the idea that you are accepting any responsibility for preventing people from damaging your cables.

H.J. Koeslag (Robertson): The problem, Mr Quizmaster, seems to boil down to the fact of indicating the position of the cable in some way. At the moment we cover our cables with about a foot of soil, as well as laying over the whole length of the cable an orange-coloured, plastic tape marked "Danger - Electrical Cable" in the different languages. Thank you.

E. de C. Pretorius (Potchefstroom): Mr Quizmaster, unfortunately mechanical excavators can't read! (laughter)

A.F. Turnbull (Vereeniging): I think the phrase 'recommended depths'

is to be preferred to standardisation. This will also implicate us with the common service facilities, though. I would suggest then that we put the Post Office cables above ours. Anybody chopping into those won't do it again! (laughter)

L. Fitcher (Kempton Park): Mr Quizmaster, in Kempton Park we have a 'recommended' depth of cable as well as a recommended distance from building lines. However, with all the excavations taking place on the roadwork around this area we found that our cables were being damaged practically every week. We then took the precaution of actually opening up and showing them the exact location of the cables, but nothing daunted the Bantu on the excavator continues to dig them out regardless!

E.E. de Villiers (Rustenburg): In verband met die vraag van mnr. Lombard oor die legging van kabelle waar jy werklik nie die vlak van die grond kan vasstel nie: ek dink tog dat met goeie voorafontwerp en koördinasie kan 'n mens darem binne 'n paar sentimeters kom van jou werklike finale diepte. Dit is in elk geval wat ons trag om te doen en ek glo ons sal dit regkry. Ek het nie geweet, mnr. die Vraesteller, hulle gaan so 'n verskil maak tussen standaard en aanbevole dieptes ens. nie. Ek moet egter vir u sê dat ek glo mens kan standaardiseer tot 'n groot mate (ek sou reken seker 99%) op die posisie van jou dienste langs jou paaie en strate. Waar die dieptes miskien kritiek is kan jy die minimum dieptes van jou verskillende kabelle bepaal. Ek glo nie iemand gaan 'n kabel 3 meters begrawe nie behalwe miskien in kruisings met ander dienste.

Ter regverdiging van die ander departemente en ander instansies wil ek darem ook nog melding maak van 'n voorval wat ons onlangs gehad het waar ons 'n waterpyp van die ander departement moes kruis. Die waterpyp was oopgegrawe tot net by sy vlak. Ons moes toe dieper gaan en die voorman het die Bantoe met sy pik gewaarsku van die nabyheid van die waterpyp, maar hy't skaars sy rug gedraai toe kap die Bantoe 'n gat deur die waterpyp! So ons kan ook skuldig wees; ons moenie net altyd na die ander mense kyk nie.

J.A. Loubser/...

J.A. Loubser (Benoni): Mnr. die Vraesteller, ek wil vir u vertel wat werklik met my gebeur het al beskou u dit miskien as 'n grap. Ek het 'n geval gekry van iemand wat 'n kabel raakgekap het maar hy het net eenvoudig geweier om te betaal vir die regmaak van die kabel, omrede dat dit maar net 'n voet onder die grond gelê was. Dit was juis net 'n voet onder die grond gelê, mnr. die Vraesteller, maar dit net nadat die man 'n „sunken garden" van twee voet diep gemaak het! (gelag)

Daarom is ek glad nie ten gunste van standaardisering van die diepte van kables nie en indien iemand my vra hoe diep die kabel lê, sê ek vir hom ons probeer dit so tussen een en drie voet lê. Dis al antwoord wat ek gee.

I.H. Mess (Cape Town): Mr Quizmaster, the engineer of Kempton Park has my sympathies at the moment with all the roadworks here. When we built our first freeway in Cape Town we had a number of 33 000V and 11 000V cables in this area. We even went to the trouble of putting a steel wire rope about 8" above the ground on both sides of these cable routes, but to no avail!

It doesn't really matter at what depths you lay these cables or whether or not the bulldozers can read, the cables will still be dug up. I think you simply have to decide on the depths you're going to lay them in your own area. For this very reason we decided recently to raise our 33 000V and 6 000V cables from a depth of 3'6" to 2'6". This way we save 1' of digging and quite a lot of money, but I assure you they get dug up all the same.

Mr Koeslag mentioned the 2' wide orange plastic strip which was first brought out in Australia. We are now standardising on this because it does mean something to a man with a pick whereas when they strike the concrete cover slab they simply dig all the harder! (laughter) Also, this red cover strip at 7c a metre is a fraction of the cost of the cable cover slab and we find it to be the most effective.

A.H.L. Fortman (Boksburg): Mnr. die Vraesteller, ek wil graag hier mnr. Lombard se sienswyse beaam: ons moet hierdie saak prakties beskou. Weet u dat ons al kables gekry het in Boksburg wat seker omtrent 6" (150mm)

onderkant/...

All the overhead connections in Cradock were done within this period but in the municipality of Walter where I worked formerly, is nooit aanvanklik op daardie diepte gelê nie maar met die opvul en skraap van paaie kan 'n mens nie by 'n standaard diepte bly nie. 'n Aanbevole diepte sal seker wenslik wees; te diep kan 'n mens ook nie gnan nie want dan word die draagvermoë van kabels ook geraak. Daarom dink ek moet 'n mens hierdie ding prakties beskou en miskien net sekere aanbevelings maak, maar ons kan nie standaardiseer nie. Dankie, mnr. die Vraesteller.

QUIZMASTER: Only one more speaker on this question please.

P.J. Botes (Roodepoort): Mr Quizmaster, one doesn't unfortunately always have very considerate consumers. I recall one instance where an electrician was called out to a power failure, only to find that the gentlemen had built a Heath-Robinson swimming bath over two years ago which, incidentally, had never been electrically tested. From one corner to the other the house service cable was just suspended in midwater and had finally failed after repeated use as a footrest! (much laughter)

QUIZMASTER: Well, gentlemen, it does seem we should have a recommended minimum depth.

Question 9. With respect to the circular from the Chief Inspector of Factories re overhead service connection boxes, have other centres had faults from condensed moisture in the boxes and can this directive be retrospective to older connections.

E.E. de Villiers (Rustenburg): May I just ask, Mr Quizmaster, whether these boxes were on metal or tiled roofs? This is our high humidity areas but the problem is such that I think alternatives should be considered.

QUIZMASTER: We have had it in both instances - condensation in the box and the insulation strip inside the box has gone.

K.J. Murphy (Cradock): Mr Quizmaster, I believe the directive stated that the old lead-in tubes had to be replaced by a box within a certain

time. All the overhead connections in Cradock were done within this stated period but in the municipality of Walmer where I worked formerly, they had so much trouble with condensation that special permission was obtained from the Inspector of Machinery to retain the old lead-in tubes.

M.J.W. Chappell (Port Elizabeth): Mr Murphy has virtually covered what I intended to say. In Port Elizabeth there is fairly high humidity and a certain amount of salt pollution in the air. Port Elizabeth and Walmer being two different towns, Port Elizabeth objected right from the beginning to putting in cast-iron boxes on the grounds that they wouldn't be practical under local conditions. They got immediate dispensation from the Inspector allowing the old system (i.e. porcelain lead-in tubes) to continue but with the proviso that the approved wire would not be broken on the roof but taken through the tubes into the roof and any joints made on the inside.

So we got over the problem in that way but there's no doubt about it that under difficult conditions the cast-iron boxes are not satisfactory.

J.G. Wannenburg (Department of Labour, Pretoria): I should just like to clarify the last portion of that question. Regulation C.67 deals with overhead mains under subsections 1 and 2; subsection 3 deals with these lead-in boxes. Then if you read the Scope Regulation C.71 you will find that C.67 overhead mains are excluded prior to those which were installed prior to 1963, but not the connector boxes. It is therefore retrospective.

D.H. Fraser (Durban): Mr Quizmaster, I can confirm the experience of Port Elizabeth in that problems have been experienced with condensation in our high humidity areas. This trouble is possibly confined to these areas but the problem is such that I think alternatives should be considered. The heat-shrinkable tubing method is one that we favour both for reconstruction of existing connections and for any new ones that might be put up. Actually we put all our services underground now so the problem of new installations hardly arises.

I must admit that I was rather surprised at the comment made by Mr

Wannenburg to the effect that the amendment to the legislation can be regarded as having retrospective effect without the legislation specifically stating this to be so. I don't necessarily want to pursue the matter here because it is a subject of correspondence with his Department. However, it seems a little unreasonable to bring out a new law that necessitates going back over things that have been done since the commencement of the supply of electricity. In order for these to be brought up to a new standard the question of costs must arise and both the supply authority and the consumer are going to be somewhat reluctant to conform with this. After all, where does one draw the line in these matters. Can we at any stage simply change the standards and force people to make the necessary corrections at their own expense? Thank you.

J.G. Wannenburg (Department of Labour, Pretoria): Mr Quizmaster, I think I've been misunderstood. Subsection 2 of Regulation C.67 deals with overhead service mains; and subsection 3, with connector boxes. Reg. C.71 gives the scope and refers to Reg. C.63, C.67 as well as two others. However, it says that it is not applicable to overhead service mains prior to the coming into force of the regulations. It does not say so about connector boxes, though, which were in use prior to 1963.

QUIZMASTER: Thank you, Mr Wannenburg. There are no further questions from Natal, Mr President. I should like to thank all those who contributed to the discussion. I'm quite sure that the Natal members who put forward the questions will be satisfied that their problems have been solved to their satisfaction. Thank you.

PRESIDENT: Thank you, Mr Halliday, for the part you played as Quizmaster in making this a very interesting afternoon's Forum. (applause)

P.J. Botes (Roodepoort): Mr President, I should like to speak on a point of order: you recall that some months ago one of our colleagues, an honourable member of this Association in fact, got into difficulties with the law authorities in regard to certain publications found in his office. I have with me, Mr President, a rather sober publication entitled "The Electrical Review" dated 24th March, 1972. I should imagine each and every engineer

time. All the overhead connections in Cradock were done within this
received such a copy. Judging by a certain picture contained it it
I would suggest that it might be safer to ensure that such publications
have actually been passed by the Publications Control Board before
placing orders for them. Thank you.

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M. J. W. Chappell (Port Elizabeth) that has not been done since the committee
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THE PRESIDENT THEN ADJOURNED THE MEETING FOR THE DAY

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Can we at any stage simply change the standards and force people to make
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members of the committee who have been invited to attend the meeting
and thank you for the interest and support that you have given to the
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gives the same regulations as Regulation C.67, but as well as overhead service

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to the coming into force of the regulations. It does not say so about
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Further than the average illumination calculation. This can be done
OPENING SESSION (Friday, 26th May, 1972)

The President welcomed Mr R.S. Yates and called upon him to deliver his paper to the meeting.

R.S. Yates, M. Illum. E.S., M.A.P.L.E., C.G.I.A. thanked the Association sincerely for the invitation to address the Technical Meeting and pointed out a typographical error in the printed version where the word 'contract' had come out as 'concrete'. He then proceeded with the presentation version: S.A.B.S. 098 PLUS 5 (A Review of Street Lighting over the past five years)

Five years ago last month the SABS published its code of practice for public lighting part 1 entitled "The Lighting of Streets and Highways". In the published version of this paper I have tried to cover the developments and problems which have arisen since the issue of the code. In this presentation version I hope to review some of the present and proposed design methods in more detail, to discuss and illustrate some of the equipment now available and finally to take you on a short "Cook's Tour" of recent lighting installations in this country and overseas.

At the outset I feel that we must accept the principle of "high and even road luminance" as the basis of street lighting design. Economic aspects dictate the use of this principle since any form of direct vision by artificial light would require high levels of illumination which would be prohibitively expensive. This principle is the basis of the C.I.E. recommendations and the codes used in Europe, including Britain, and our own country.

What are the essential factors for design on a luminance basis? First we need details of the light distribution from the luminaire; secondly, the geometry of the installation and, finally, the reflecting properties of the road surface. From the light distribution and the geometry, we are able to calculate the average illumination. From the geometry and reflection characteristics of the road surface we can obtain a luminance yield coefficient, and from this coefficient and the average illumination level we can calculate the average road luminance. The American code goes no

further/...

further than the average illumination calculation. This can result in such incongruities as an installation of 400w high pressure sodium lamps installed at 35 ft. above the road level at a spacing of 415 ft. It is important that we fully appreciate the different factors involved when designing for illumination or luminance. The difference in the illumination and luminance curves which can be obtained from one luminaire can be illustrated. I have frequently heard of engineers who assess the efficiency of a luminaire by measuring the levels of illumination achieved on a roadway. When designing on a luminance basis these levels in themselves are of relatively little value and can very easily give completely misleading information as to the suitability of one luminaire when compared with another.

Let us now consider the three basic factors in greater detail. The light distribution from a luminaire is dependent on the following:

1. Light output from the lamp.
2. Efficiency of the optical system.
3. Reflecting/Refracting properties of the optical system which determines how the lamp flux is directed.
4. The accumulation of dirt and/or corrosive elements on the optical components during service.

Each of these factors must be known before design procedures can commence. The manufacturer through his own laboratories or through an independent laboratory such as the SABS must provide details of the first three factors, and the fourth factor must come from experience gained in the field by the designer and will depend on the locality in which the luminaire is to be used e.g. proximity to industrial areas, mine dumps, railway yards or in cleaner residential areas. The quality of design and manufacture of the luminaire and materials used for gaskets will also play a significant role.

The geometry of the installation covers the following:

1. Mounting height of the luminaire above road level.
2. Overhang of luminaire beyond the roadway kerb.
3. Spacing between luminaires.
4. Layout of luminaires e.g. single-sided, staggered, opposite, central median/...

median, or combinations of the last three.

The choice will depend on numerous factors, some of which have nothing to do with lighting, such as the presence of storm-water drains, kerb inlets etc. Guides to minimum mounting heights are given in many codes including the SABS code, and are dependent on factors such as light output from the lamp, width of carriageway or peak intensity values from the luminaires. Maximum lengths of overhang are governed by the overall width of the road and/or sometimes the mounting height. The spacing is dictated by the average illumination or luminance level required by the maximum diversity of each considered permissible. The layout will depend on the road width and the uniformity required.

It is often necessary to try out many permutations and combinations of these parameters before the ideal geometry is achieved.

We can now calculate the average level of illumination on the roadway from this formula. \bar{E} is the average illumination level in lux; ϵ (Eta) is utilisation factor; ϕ (Phi) is the lamp flux at planned replacement time, f is a depreciation factor dependent on atmospheric conditions and planned cleaning frequency; and s and w are spacings between luminaires and the road width respectively.

Our third factor in luminance design is the reflecting properties of the road surface and frankly, this is where our troubles start! The characteristics of the road surface depend on the following:

1. Material of the surface: The material, be it light-coloured concrete or a dark non-skid black surface dressing, will determine how much of the light falling onto it will be absorbed and how much reflected. The surface characteristics will also reflect the way in which the non-absorbed light is reflected. A smooth shiny surface will reflect the light specularly at an angle equal to the angle of incidence and in the opposite direction to the incident light. A very rough surface can approximate a perfect diffuser from which the light is reflected equally in all directions. Most road surfaces, however, are a combination of these to a widely varying extent.

2. Texture: As soon as a road surface is laid its reflecting properties start to change, either due to natural elements such as wind, rain and sun, or to wear from traffic passing over it. Rough surfaces tend to become polished and smooth by the action of tyres upon it, and light surfaces become darker with deposits of rubber and oil. Sand blown onto and pressed into the pores of the surface can also change its colour.

3. Presence of Moisture: A dry and a wet road surface have completely different reflecting properties. Moisture, which can come from rain, dew or snow in certain climates, acts like a mirror and reflection becomes extremely specular. The significance of this factor must depend on how frequently moisture is deposited and its duration. In South Africa rain occurs usually in the form of heavy storms at infrequent intervals whereas in some overseas countries it has been calculated that road surfaces are moist for more than 70% of the year.

Having determined the installation geometry and average road surface characteristics we can now calculate the luminance yield coefficient. In the SABS code six road surfaces are classified as light, medium or dark. In practice it is extremely difficult to match these pictures to any real road surface. Every person I have spoken to who professes to use this code has taken the easy way out and classifies every road surface as "medium". I do it too! (laughter) Then, from a simple table which relates luminaire distribution to the road surface we obtain a factor which we use to convert the luminance requirements to illumination and then we're well away towards calculating our lighting on an illumination basis. In the SABS code we now feel we have paid our respects to the road surface and take no further note of it. All subsequent calculations of uniformity etc. are made purely on an illumination basis and we ease our consciences by quoting, "It has been found in practice that if certain parameters of the installation are controlled and the illumination uniformity ratio does not exceed the recommended luminance by more than 50%, a satisfactory installation will normally result".

This may well be good enough at the present time, but if the C.I.E. amendment proposals are accepted and the SABS adopt these we will have a very different situation on our hands.

Before going further with this aspect I would like to refer quickly to the British code and its method of applying the various design factors. Before I am accused of Anglophilic tendencies let me hasten to say that I do not propose the adoption of these codes in preference to that of the SABS, but I do feel that if we are happy to apply our own code as we are doing at the moment, work can be simplified by compiling design tables and luminaire distribution characteristics. In the British code, after a luminaire has been chosen and suitable layout selected, it is then simply a matter of referring to the correct table and the rest of the design features can be obtained. If we remember that this code too was based on luminance surely we can adapt our own code in a similar manner. I stress here again that it is extremely important in our country that every street lighting engineer and designer works to one code only. To encourage him to do this it must be made as simple as possible to apply.

Now let us go on to the C.I.E.'s proposed amendments to their document 12. Basically these come under two headings: a) Uniformity of luminance and b) control of glare. Let us go back for a moment to the method of designing average luminance. I have shown how we can calculate the average illumination and how we skirt around the luminance yield coefficient to arrive at our design factors. This coefficient does, however, need to be more accurately determined. As is shown here it is dependent on the road surface, and every different surface provides a different coefficient for each lantern. It is from data such as this, which the manufacturers must provide, that we calculate our yield coefficient. Finally we can now apply this formula to determine the spacings to be used. S here is the spacing in metres; ϵ_L (eta) the luminance yield coefficient; ϕ (Phi) the lamp flux; f the depreciation factor; \bar{L} the designed average luminance and W the road width.

To check luminance uniformity in accordance with C.I.E. proposals it is necessary to apply one of two methods. Iso-luminance diagrams can be used and superimposed on each other on a drawing of the roadway. From this maximum

and/...

on its first section of the motorway pioneered a new form of median lighting with the luminaires mounted axially. Special poles were designed and fittings developed to give the correct distribution of light.

The same system was used on the next section of the motorway but with a re-designed pole. In order that the poles could be mounted vertically and the fittings mounted parallel to the roadway, special fixings were developed to allow the bracket arms to be adjusted over a pivot point on top of the pole. The resultant effect is less cluttered than the twin stem pole and optical guidance at night is excellent.

A further development of the axial median lighting system is now widely used where the lighting equipment and cables are carried on a catenary suspension system. For the first installation in South Africa manufacturers co-operated in producing special fittings for attachment to the catenary system. Correctly designed optics can produce excellent results.

The same principle has been used in Germany on main roads. Even with the confusion of other road lighting systems, the convolutions of this main road remain obvious. Less successful is the rather crude cross-street-catenary in the centre of Copenhagen.

High mast lighting of motorway interchanges was developed overseas and shortly afterwards was introduced to this country, the first of our installations being in Johannesburg. The original luminaires were imported but the poles were manufactured in South Africa. To raise and lower the luminaires for servicing hand or power operated winches are installed in the bases of the masts. A plug socket provides the supply for the power tool.

For newer installations the luminaires were partly manufactured and assembled in South Africa and the resultant lighting effect is fully up to expectations. Newer designs of high mast units are now available in which the optics can be altered to provide non-symmetric distributions so that the lamp flux can be more accurately directed onto the motorway and thereby improve the efficiency.

Similar/...

Similar principles to those of high mast lighting are now applied with "intermediate" masts i.e. mounting heights of 10 to 20m for main road intersections. The old system of mounting single lamp luminaires on 4-5m poles in the centre islands of intersections has become impracticable and even dangerous. To provide adequate illumination and coverage over the complete intersection would require high output lamps which would be glaring at that low mounting height. Furthermore, should that one lamp fail, a portion or whole of the intersection would be in darkness. Pleasing as the appearance of these post top lanterns is, they are being forced out by the needs of safety at major intersections. Multi-lamp units are used to avoid dark patches if a lamp should fail. The lamps can be grouped in one luminaire or in multi-lamp units using conventional street lighting luminaires. At night good overall lighting is achieved with the layout of the islands and the roadways clearly distinguishable. The same system of intermediate height masts can also be used to light public park areas or roadways in the vicinity of civic centres. Very wide intersections, where normal poles could not provide the required luminance, have been successfully lit by means of 2 lamp 700 watt mercury post-top mounted luminaires.

From mounting heights of 30 metres and more we drop down to street lighting with installed heights in the order of 1 metre. Parapet lighting has been installed in Durban on one of the ramps of their motorway system. Fluorescent tubes are mounted behind special louvres to control glare, which would otherwise be severe at that mounting height. Good results have been obtained. On the bridge spanning the river Rhine between Ludwigshafen and Mannheim in Germany parapet lighting has also been installed. As the road width is about 14m this has been supplemented by two 3,5kW metal halide lamps in floodlights mounted at the top of the 80m high central suspension tower. The effect at night is not only good from the street lighting point of view, but the spectacularly illuminated tower can be seen from long distances and is a feature of the river at night.

A new problem for South African lighting engineers will be the illumination of tunnels for motor traffic. The complexities of the subject could justify a paper on its own. Briefly, the problem is to adapt the driver's eyes during daylight as quickly as possible to the comparatively low levels of

luminance inside the tunnel. Light control must start well before the tunnel entrance by firstly ensuring low brightness areas in the field of view of the driver. In this scheme specially planted trees and shrubs on the sides of the entrance of the tunnel helped to achieved this. To reduce luminance levels still further, special screens are built over the roadways to reduce the high daylight levels of luminance by 85% - 90% before the driver enters the tunnel itself. Inside the tunnel high levels of lighting must be provided near the entrances which can reduce steadily over the length of the tunnel. Although tunnel lighting has not yet been installed in South Africa, I was recently alarmed at the high luminance of the concrete facing and stonework of a newly constructed tunnel in the Transvaal. The sudden plunge into the darkness of the tunnel was a frightening experience. And the speed limit was 70 m.p.h.

The techniques of street lighting and the materials available have come a long way since the first arc lighting of the Place de la Concorde in Paris by Delaisil in 1844. The charming gas and oil lanterns of the early days of this century gave way to the birds' nest specialities and ugly lighting distribution network effects of the between war years.

To-day, the engineer must face his responsibilities as a contributor to the appearance of his city and the safety of all who use the roads at night. Streets are an integral part of city and town life today and if the lighting of these is to be effective, proper consideration must be given to correct design procedures and reliable equipment. Thank you, Gentlemen. (applause)

PRESIDENT: Thank you for an excellent paper, Mr Yates. I'm sure it will invoke some very lively discussion this morning. Before throwing the paper open for discussion, though, I should like to make a few observations on it myself. I fully support Mr Yates in his views that we have been very lax in applying our own code but, as I see it, we have our reasons for this: the first is a financial one and the second, a technical one. We smaller councils have neither the funds nor the people to do this. However, something good may come out of this paper if we can now work in that direction. With these words, I now open the paper for discussion.

J.W. Smit (SABS, Pretoria): "Mr President, gentlemen, Mr Yates has deviated considerably from the printed version of his paper. I want to congratulate him on his excellent delivery this morning. It was very good and I enjoyed it. I will, however, have to restrict my comments to the printed version as that is all I had to refer to beforehand.

Mr Yates concluded his paper with this very imposing statement: "It is only by applying the correct techniques and using the proper equipment that we can hope to reduce the appalling accident rate on our roads at night". I had found it quite impossible, though, to discover just what the author regards as 'the correct technique'. It cannot be the British approach because he states that the influence and leadership have swung to the Continent and that the amount of research into street lighting done in England has markedly declined since 1960. This seems to rule out the British approach and I would subscribe to this, gentlemen.

He then proceeds to inform us that after putting a lot of work into a study of the C.I.E. document, British members found that very many of their installations complied with the C.I.E. requirements. This is probably true, but I think accidental.

It seems he condemns the C.I.E. approach as being too difficult to apply. This immediately also condemns the SABS code which is based on the C.I.E. approach. I begin to get the impression, gentlemen, that the correct technique is the simple, quick-and-easy way of doing things.

Unfortunately Mr Yates chose not to indicate clearly what he has in mind when he refers to 'geometric recommendations based on or allied to luminaire distribution'. I rather get the impression that he favours the British code and this, I think, would be a tragedy for South African engineers. Surely the fact that the initiative has swung to the Continent is justification in itself for subscribing to the C.I.E. methods.

Also, I see no reason for his using the British objections to the C.I.E. code to cast doubt on the practicability of the SABS code. I think it would have been much more informative had he attacked the SABS code directly. The British objections are, in any case, not of a fundamental

nature/...

nature but of a technical nature and I think, therefore, we should leave it to the C.I.E. Committee to settle these objections. After all, this is what the C.I.E. Committee is for and they consist of a number of extremely well trained men who are engaged in a lot of research.

Rather than discuss the British objections to the C.I.E. code (and therefore also to the SABS code) I would prefer to briefly restate two of the reasons why the SABS Committee decided to use the C.I.E. recommendations as a basis for our code. The first is that we can benefit from the tremendous amount of research which is now being done on the Continent over the past 15 years, because we can so easily incorporate this into our code. Secondly, if our code is applied it will select the most functional luminaire for the job. This is, I think, a tremendous advantage and one which we should consider very very carefully. It will perhaps lead to manufacturers being a little more on their toes by way of encouraging them to produce better equipment.

A further issue that was raised was that our code is too difficult to apply. I don't think this is really so, gentlemen, because basically we have two steps: first we have to determine the maximum spacing that we can use for any given luminaire; and secondly, we have to find by way of inspection whether this luminaire at maximum spacing will give an acceptable uniformity on the road. This is how simple it is and I think many people criticise it without really having tried to apply it.

How much simpler must it become to constitute a code which will be simple enough to be applied, in the words of Mr Yates, 'by any electrical engineer'? And, having made it so simple, will it then be simple enough for those who are not engineers but do do street lighting?

In conclusion, gentlemen, I'm sorry to have to say it but it seems to me that Mr Yates subscribes to the 'recipe method' which offers no scope for individuality and will therefore kill the development which he calls for in other parts of his paper.

In his paper Mr Middlecote quotes the following definition of engineering by Arthur M. Wellington: "To define it rudely but not ineptly, engineering is the art of doing that well with one dollar which any bungler can do with

two - after a fashion". I can't help thinking that the author has made a very strong case for street lighting "after a fashion". Thank you, Mr President. (applause)

H. Barnard (Brakpan): Mnr. die President, eerstens wil ek vir mnr. Yates baie bedank vir die interessante lesing wat hy vir ons gegee het vanoggend. Ek dink ons het almal daardie toer van hom baie geniet.

Tweedens, is hier vanmôre die twee uiteenlopende menings waartussen die arme ingenieur wat die werkeintlik moet uitvoer, moet kies. Mnr. Smit het nou 'n paar aanmerkings gemaak wat vir my baie na aan die ideaal lê, maar ek glo nie hy het enigsins gedink wat gaan gebeur in die praktyk nie.

Mnr. Yates het netnou vir ons 'n formule gegee wat die spasiëring van pale aanwys, maar ek kan vir u sê dat as ons daardie formule gaan gebruik kan u vergeet om 'n straatligskema te ontwerp, veral in 'n reeds-bestaande gebied.

Mnr. Smit het genoem dat 'n mens is geneig om nie die distansies baie wetenskaplik te bepaal nie, maar ek het gevind dat as jy 'n straatligskema wil ontwerp vir 'n bestaande gebied, dan bepaal jy eers die straatlig posisies. Dan gaan jy uit en kyk of hulle sal inpas en herbepaal hulle heeltemaal, waar jy sal vind dat dit glad onmoontlik is om die formule toe te pas. Laastens, gebruik jy die beste ligarmatuur wat jy kan kry om by daardie spasiërings te pas.

So kan dit gebeur dat as 'n mens 'n straatligskema ontwerp dat jy vind dat jou spasiërings vooraf bepaal is op distansies wat wissel van 100' (33m) tot 25' (8m). In baie van die strate waar daar straatligte ontwerp voor moet word, is die spatie bepaal deur die grense van standplase. As jy die formule sou gebruik sou jy vind dat jy moet 'n paal reg in die middel van 'n in- of uitgang van een of ander standplaas hê, en dit is net nie moontlik nie.

Die ander probleem wat 'n mens het van tyd tot tyd is die pad oppervlak. As 'n mens nou 'n skema vat en ontwerp dit en jy werk hom uit volgens hierdie formules wat ons vanmôre hier gesien het, gaan dit baie oulik wees, maar u sal vind die oomblik as u daardie verbeterde beligting aanskakel, dan kom

die/...

die raadslede en die stadsingenieur daar verby; hulle sien in daardie helder ligte wat jy daar opgesit het, hoe jy hulle pad stukkend gekap het, en hulle sit 'n nuwe oppervlak daarop wat jou hele skema verwerp.

One system that we did consider in Brakpan where we have recently done a street-lighting scheme, was the catenary system. Design on this system was already far advanced when a car crashed into a pole bringing down the overhead lines and that was the end of the catenary system!

This morning Mr Yates requested the SABS to give serious attention to a standard specification for street-light fittings. I should like to ask that they please include in this legislation for the execution of vandals! Thank you, Mr President. (laughter)

PRESIDENT: Thank you, Mr Barnard. Gentlemen, please be brief in your discussions so that we can give Mr Yates time to reply.

J.T. Grundy (Phosware (Pty.) Ltd., Springs): Mr President, Mr Yates, gentlemen, I speak as a manufacturer and designer. The British code has been mentioned here this morning and I would like to state at the outset that there is very little difference between the SABS code and that of the British. The latter is based on what was known as road brightness which today is known as luminance. The basic difference is that the British code provides the tables for the geometry of the installation whereas the SABS code, in effect, provides you with complete guidance as to how you should carry out an installation.

The surprising thing to me, though, is that here in the Republic the code seems more often to be ignored than applied. We get tenders and enquiries for high-beam, semi-cut-off and cut-off luminaires. Mr Barnard for one uses our high-beam luminaires, yet I would question whether his installation complies with the SABS code.

Mr Yates, I see, tends to criticise the manufacturers to a certain extent in regard to what their 'parents' allow them to do. I have 'parents' in the United Kingdom from whom I get letters which on occasion seem to imply

either/...

either that their offspring is slightly insane or that there is no relationship whatsoever! (laughter)

Also, I have seen many luminaires here in the Republic which have been imported from various other countries, some of which - even from my own country - are not suitable for South African environmental conditions.

Finally, there are just two questions that I would like to ask Mr Yates: Where does he think the future lies in regard to metal halide lamps and high-pressure sodium lamps? And in which direction is the Republic going to go in regard to residential road lighting?

To sum up: I'm not too happy about Mr Yates' criticism of South African manufacture. We ourselves have a laboratory in which we do very thorough testing and we are very grateful for the co-operation of the SABS and also to both Mr Middlecote and Mr Smit for the assistance we've had from them. Thank you, gentlemen.

J.L. McNeil (Kokstad): Mr President, in the case of many small towns in the Republic even the principal streets are densely tree-lined and this is regarded as an attraction. Could Mr Yates please tell us how he would effect a compromise in lighting such streets. Would he concentrate on the sidewalks which are extensively used by pedestrians and exclude the road or vice versa? Thank you.

A.A. Middlecote (SABS, Pretoria): I'm not a lighting man by any standards but there is something I feel that I must put forward as a matter of principle. A code of practice exists as a document which gives you the latest scientific knowledge condensed in a form which allows you to apply that knowledge and which also forms the basis of all the commodities that arise from that code of practice.

To give you an example: we had a shocking code of practice in our Wiring Regulations and the British Wiring Regulations was just as bad. This resulted in an awful amount of confusion when we came to pass judgement on the commodities that rose from that basic code. Now after 50 years the

world is waking up and trying to get a logical, basic code for electrical installations.

Let this be a lesson to us. We have the job of drawing up a code of practice for lighting which we want to be dynamic, to keep up with technology and such a code can only be a code which is based on sound, scientific principles. Whether all the answers have been found or not doesn't matter; they will be found.

What does puzzle me, though, is why you don't base your requirements on luminance since from what I hear surface luminance is the most important factor for safety even in the study of glare which is merely background luminance. It's an easy conversion to come to other forms of simple approach if you distrust the reliability of road surface luminance factors. However, research will find that out as it has done most problems.

This also gives you the opportunity of considering what changes are due to environment such as wind and differing rainfalls, and a basic code which is based on luminance allows for this.

We must also realise that with the present progress of the world the demand for good lighting is going to increase. Take, for example, America where they're going crazy on safety - ecology environmental work. Mr Yates has already pointed out that we must not only have safe roads from a luminance point of view, but we must also have good-looking street furniture and this is becoming a terrific professional job. If it is ultimately a professional job then surely the code must be basically a scientifically correct one that will keep pace with modern progress.

After all, in the long run, the code is to be used by professional men and therefore must be difficult, since we're paid as professional men and as such are trained to deal with adverse circumstances. If this is not true then my whole management of codes is at fault and I shall have to do some re-thinking, not only in lighting but in other fields as well.

Then, too, as regards Mr Yates' last reference to research I must remind him that a good photometric laboratory costs a minimum of a quarter of a million

stands. The manufacturers will be very fortunate to find this amount of money and I think it would be far wiser to give it to Mr van Wyk to enable him to do more research.

As it is, we have existing Bureau facilities and laboratories within the CSIR which have the basic equipment to deal with interior lighting problems as well as the National Physical Research Laboratory. In any case it's not so much a case of a laboratory but the necessary encouragement that is needed to discover the missing factors. Thank you. (applause)

PRESIDENT: Thank you, Mr Middlecote. Gentlemen, is somebody prepared to defend the municipal engineer?

J.I. Inglis (Pietersburg): Mr President, gentlemen, you know as electrical engineers we all have this one big problem. In fact I sometimes wonder why we even need to call in the Bureau of Standards because our basic problem is that we all have ratepayers, each of whom claims to be an expert on street-lighting!

In lighter vein: actually the ratepayer is not really concerned with street-lighting at all; he wants lighting to protect his premises. As far as he's concerned the cars have their own lights and that we don't need streetlighting as such. I think this is some food for thought.

W.F. Cronje (Peri-Urban Areas): Mr President, as regards high-mast lighting for security purposes particularly in an industrial township, I am inclined to agree with Mr Inglis. However, I should like to hear the opinion of Mr Yates on this subject, or should I rather approach the Bureau of Standards for an answer! (laughter)

J.A. Loubser (Benoni): Mnr. die President, ek wil glad nie die munisipale ingenieurs verdedig nie, intendeel wil ek die vervaardigers aanval. Mnr. Yates het gepraat van die estetiese voorkoms van straatligarmature. Dit is so, ons moet probeer om iets moois te ontwerp, maar dit is ook werklik so dat die ingevoerde artikels esteties baie beter lyk as dié wat in Suid-Afrika vervaardig is. Ek praat nie nou oor die rendement van die toerusting

nie. Dit is baie goed en daarvoor kan ons nie klaar nie. Maar esteties moet die Suid-Afrikaanse vervaardiger ook probeer om te verbeter. Dankie.

H. Barnard (Brakpan): Actually, Mr President, I foresee quite a future in implementing the proposition Mr Inglis has just made. We can commandeer some of these "professionals" who are paid so dearly according to Mr Middlecote (though I doubt whether this applies to the smaller municipalities such as ours) and send them out to an industrial or residential area where people are wanting light in their backyards. There they can work out by means of a formula the luminance of the surfaces involved, and at the same calculate how much of the luminance that should be in the street is now in their backyard and make them pay the Council accordingly! (laughter)

PRESIDENT: Good idea, Mr Barnard!

P.J. Botes (Roodepoort): Mnr. die President, as gevolg van die vinnige uitbreiding in Roodepoort het ons die probleem dat die Raad jaarliks groot hoeveelhede bedrae beskikbaar stel vir sekondêre straatbeligting. U weet dit is seker een van ons belangrikste straatbeligting installasies in die hele land, maar beseef u, mnr. die President, dat daar eintlik in die Gebruikskode van die SABS nie 'n spesifikasie is vir sekondêre straatbeligting binne 'n dorpsgebied nie. Daar is ene in die heel laaste kategorie vir sypaadjies langs hoofweë, maar as u daardie kode toepas op sekondêre straatbeligting in dorpsgebiede, dan weet ek nie waar ons stadsvaders die geld vandaan sal kry om straatbeligting eers te doen nie. Daar is dan nog daardie leemte in die Gebruikskode.

Ek het reeds in die verlede aan die SABS geskryf in dié verband maar het nog nie 'n antwoord gekry dat daar op die saak ingegaan sal word. Tot op datum lyk dit vir my het nog niks gebeur nie.

Dan is daar ook die groot probleem om die kode te probeer volg. Dit gee vir my heelwat probleme want dis nie iets wat ek my daagliks mee besig hou nie. Ek kyk maar so een maal in 'n jaar in die kode en probeer iets ontwerp. Daarna moet ek dit uitsit op tender en kry dan 'n hele klomp tenders van verskillende tipe lampe en dan moet ek weer oor-ontwerp.

'n Ander metode natuurlik is om die verskaffer van toerusting te vra om vir jou straatligting uit te werk. Mnr. die President, ek weet nie of u een van hierdie ingenieurs is wat dit al gedoen het nie en dus juis uitgevind het hoeveel verskillende tipe straatbeligting installasies jy kry. Blykbaar het elkeen sy eie Suid-Afrikaanse kode!

Wat ek eintlik wil sê is: dit kos geld om 'n goeie hoofweg installasie daar te stel en dit is veral moeilik met kleiner dorpsgebiede waar daar vinniger ontwikkeling in die dorpe self is, om bv. hoofweg-straatbeligting aan te pak. Ek kan u net 'n voorbeeld noem: in Roodepoort, tot my uiterste skam, staan een hoofstraat al jare halfpad klaar met nuwe straatbeligting armature weens die feit dat die Raad aanhoudend betoog dat dit maar 'n B of 'n C prioriteit is en dat dit afgeskrap moet word van die jaarlikse begroting. Wat kan 'n mens maak? Dankie, mnr, die President.

E. de C. Pretorius (Potchefstroom): Mnr. die President, na aanleiding van wat mnr. Loubser van Benoni gesê het, wil ek darem in die bresse tree vir die vervaardigers. Met die bietjie ondervinding wat ek het in die verband, kan ek vir u sê dat van die plaaslike produkte wat ons al gebruik het, vergelyk met die beste wat ons ingevoer het.

M. Kirsten (A.E.G. - Telefunken (Pty) Limited, Johannesburg): I wish to say something about the manufacture of locally produced fittings. I have to congratulate and support Mr Grundy of Springs. The fittings which we produce in this country are made to precise overseas specifications and we therefore cannot produce something which is not 'related' to that overseas company. The aesthetics of the fittings are also more or less determined overseas and the local product is therefore definitely of the same standard as the imported one, despite opinions to the contrary. That applies to our fittings anyhow.

A.F. Turnbull (Vereeniging): We have tried to use the SABS code as far as possible, and have also experienced difficulty as regards the question of the amount of funds allocated to this work. A study of the SABS code does enable one to ascertain the type of road you wish to light; one of

the/...

the practical problems being to ascertain the category of road. We have roads which for comparatively short periods would be classified in the higher categories but for the remainder of the evening, fall right down in the very lowest category.

What we have done with the limited funds at our disposal is to plan a scheme that could alternatively be extended to meet the code. However, once you have put some lighting up, you seldom have a chance to get back to it because there are so many other commitments.

Another problem involved in keeping to the code is that with the higher mounting heights you require special equipment, the cost of which is prohibitive in itself. Here again we have compromised by making use of the Fire Brigade vehicles. It keeps them in practice and we might even have a few budding streetlight attendants among them!

Generally speaking, though, I do think we should support our own code as a considerable amount of work has gone into it. As far as the lighting of small side-streets is concerned, we simply don't even attempt it. All that is wanted is security lighting and this we do. Thank you.

I.H. Hess (Cape Town): Mr President, I'm fortunate in that I have a lighting engineer so I don't have to understand the code at all! I don't! (laughter). However, my lighting engineer does assure me that in Cape Town now we are following the code.

Before I say anymore, I should like to establish whether the provincial authorities in the Transvaal are helpful as they are in the Cape. If so, I would suggest to Mr Botes that he get his main road declared a provincial main road, in which case they will then light it for him. On provincial roads in the Cape we get an 80% subsidy which means that all the Council has to do is find the finance and Province then pays the interest and redemption charges on that scheme.

So as regards main roads we are very fortunate and even with other roads we seem to have a rather 'enlightened' Council that keeps clear of lighting, fortunately for me, and we don't have much trouble there.

The question was raised about suburban roads and here I'm quite sure I don't follow the code because there is no possibility of doing so. Mr. Barnard mentioned the problem of designing a scheme and the near impossibility of being able to apply it. What makes it even more difficult in most of the suburban areas in Cape Town (and doubtless this applies too to the rest of the country) is that we are saddled with these overhead reticulation schemes. Certainly 90% of Cape Town has overhead reticulation and it is only in the newer areas that we can put in underground cables for supply and are therefore a bit freer in our design of lighting schemes.

On the whole, though, we are tied down to the existing positions of the poles. This is fine when they are of the order of 120' apart but they generally vary from between 60' and 90' to about 200' apart. Either way you end up by putting up too many of the type of fittings you want so as to avoid any come-backs from the ratepayers as to why their particular pole has no light on it.

When we first started a scheme in Cape Town three years ago to change over to high-pressure mercury vapour 80 watt and 125 watt lamps in all our suburban areas, I was horrified to receive a phonecall from a resident in Camps Bay threatening that unless I removed the lamp put up outside his house he would not only shoot it down, but any replacements as well! So you just can't win, Mr President. Thank you. (laughter)

A.F. Turnbull (Vereeniging): I meant to raise this earlier: we have a particular problem of lighting in that we have been requested by the Road Safety people to give some consideration to the lighting of pedestrian crossings. Again it's a question of economics and I would like any suggestions on effective and simple ways of doing this.

C. Lombard (Germiston): Mr President, in reply to Mr Hess, I can tell him that we in the Transvaal are not as fortunate as the engineers in other provinces. Representations made to the Transvaal Provincial Administration some years ago to subsidise streetlighting along provincial roads, were turned down flat. I think that this is a matter that the AMEU could perhaps pursue again.

I can also tell him that along these main thoroughways they don't want to see poles anywhere near them. As a matter of fact, they don't want lighting at all as they regard it as a hazard. Thank you.

K.G. Robson (East London): I'm a bit diffident about putting this question to Mr Yates and I'm not sure if he has the information, but I wonder if he could tell us whether the actual median installations can be justified on economic grounds. We've done some studies and it seems to me to be a very expensive installation.

PRESIDENT: Thank you, Mr Robson. Mr Yates, would you care to reply to all the questions.

R.S. Yates (Assistant Electrical Engineer, Johannesburg): Mr President, gentlemen, I have a formidable task ahead of me. I cannot guarantee to cover everything but I'll try and cover as much as I can.

Firstly, I must comment on the business of the SABS. Mr Smit asked what I define as the correct technique. The correct technique, gentlemen, is the SABS technique. I don't deny this and I never have. It is the best; it's been laid down on extremely sound principles and one must work on these principles. We do endeavour to do this and if everybody in South Africa did, frankly my paper would have been of a totally different nature.

I believe that if we've got a code of practice, it must be a living code, a code which is used by everyone. It must be something which is growing and from which we're getting experience and it must be acceptable to everybody.

I have checked with a number of our commercial people who get around the country and I've watched tenders being issued and from this it appears that the majority of engineers do not appear to be using the code. We still see tenders being issued for non-cut-off 400 watt lanterns. My commercial friends tell me that they sell more of these than they do of lanterns complying with the code of practice.

This makes me unhappy because fundamentally I believe in this code and I

feel it should be applied far more. In trying to find a reason why this isn't being applied, I feel possibly that the time factor comes into it. There are problems and maybe some form of tables would simplify it. My main only fear is that the code will become more complex as the C.I.E. change their recommendations.

However, Mr Smit and Mr Middlecote, I certainly believe in this code but I would like to see the use of tables as a starting point for engineers and then, as they become more used to it, they can proceed with the other parts, particularly as we get facilities for measuring road surfaces which we don't yet have.

Incidentally, I have brought along with me today a luminance meter which we own in Johannesburg. It is an instrument used for checking road luminance afterwards. Also, I've been lent a little model high-mast unit which you may be interested to look at afterwards.

As Mr Barnard mentioned, road surfaces do change and I handled this problem in my presentation paper.

Protection of catenary systems: this must obviously receive a lot of attention. We've used the catenary system only down one section of the motorway where it is completely guarded along its whole length by guard-rails and specifically designed poles which can take practically any impact; certainly after the guard-rails have taken the primary shock anyway.

Mr Grundy and a number of others have touched on residential lighting. This is actually my favourite subject and one that I would like to spend considerable time on because I feel it has been grossly neglected in this country. By far the greater percentage of all our roads are residential ones, and judging from a number of publications, 46% of road accidents occur on these same residential roads. Furthermore, the greatest number of crimes are committed in residential road areas. America did an intensive investigation into this and found that by installing streetlighting on suburban streets they could reduce the crime rate by up to 60%. One significant factor quoted was that juvenile crime alone was reduced by 40%.

In the thesis which I did on this actual subject I designed what I thought would be an ideal lantern for this purpose. Unfortunately, though, I haven't managed to persuade many of the manufacturers to take this up. All in all, I think a lot of attention needs to be given to this aspect of the lighting of towns.

Both Mr Grundy and Mr Kirsten referred to the quality of streetlighting equipment. This arose purely out of the presentation version of my paper and referred to past history. The position today, I'm pleased to see, is that the quality of manufacture has certainly improved although we still have problems. Certainly the lighting manufacturers are putting up testing laboratories and that type of thing, which will help towards improving the quality still further.

I still think, though, that we need some form of code of practice as we have for so many other things. If we could merely specify that a luminaire complies with SARS specification No. X, we would be saving ourselves a tremendous amount of work.

Mr McNeil mentioned tree-lined streets: these are indeed a problem. We have one particular installation where there is a very wide street in Johannesburg. It is an area which is used quite considerably by pedestrians at night. This has necessitated putting up two installations - one for the pavements and one for the street itself.

There are streetlighting fittings which have been specially designed and by the careful placing of fittings relative to trees, or vice versa, in co-operation with the Parks Department in the design of streetlighting, you can light both pavement and street from the same light source.

I think Mr Middlecote in actual fact supported me when he said that we do need a basic code to cover every type of installation and difference which occurs throughout the country; e.g. the high wind road surface changes in Cape Town and the menace of the mine dump sand in Johannesburg.

However, he also maintained that on a luminance basis all that was needed was an easy conversion. This is by no manner of means a simple conversion, but requires very complicated and expensive equipment as seen in the

laboratories where they measure the reflecting properties of the road surface. I don't think any municipality here could afford the likes of this.

Costs keep on cropping up in the discussion. Here I'd like to quote something mentioned in the Road Research Laboratory report about a month ago. It has been calculated that the annual cost of street accidents in South Africa is R82 million. This is a phenomenal figure and doesn't take into account the human suffering and misery caused on the roads. The records state further that slightly over half all fatal accidents occur at night. It has also been proved that streetlighting accidents can be reduced by 40% with the provision of adequate streetlighting.

We are still dealing with an astronomical figure of expenditure of costs on accidents after all is said and done. Surely these costs could be far more profitably used in the lighting of streets. The figure mentioned doesn't take into account the cost of crime prevention.

Mr Cronje mentioned the use of high-mast lighting for security purposes in industry. Incidentally, the railways also use high-mast lighting extensively for this purpose, as is also done in African townships. I know of two such installations which are both very effective.

The subject of aesthetics raised by Mr Loubser is one about which I, too, feel very deeply and is one which certainly needs attention in this country. The Bureau of Standards has a design section which offers an extremely good service and there are also registered designers in this country who, I'm sure, would be only too happy to co-operate with the manufacturers in producing an aesthetically pleasing fitting. However, don't let's stop at the fitting here, but include the pole as well.

Mr Turnbull, the new section of the code of practice does give some guidance on the lighting of pedestrian crossings. This second part of the code of practice, as you know, is now out for comment, and it contains this particular section. Unfortunately it isn't easy as there are no laid down formulæ here.

I myself have seen many different methods of lighting pedestrian crossings— from specially made fittings suspended in front of and behind the crossings to floodlights. There is definitely a need to do quite a bit of research into this line of work.

Unfortunately pedestrian crossing use at night is usually restricted to the centres of towns where there is a lot of pedestrian activity. Pedestrians in these areas should, of course, be using the proper crossings at the street intersections.

Mr Robsen's query on axial median costs is not an easy one to answer off pat like this. We have done a lot of research into this and I think it depends a tremendous amount on the actual installation: each installation must be judged on its own merits and costed independently.

We have certainly found on motorways that the axial median costs, whether by means of axial median poles or the catenary suspension system, are certainly favourable. I don't say this is necessarily the case in every place. Sometimes we have difficulty finding distribution centres on long runs and to try and feed two cables down both sides of the road is often far more troublesome than one down the central median.

I hope that I have covered all the facts as I set out to do. Thank you for the very interesting discussion, gentlemen. I have found it most stimulating in the amount of interest shown. I hope a tremendous amount of good will come out of this as well as a far greater awareness and use of our own code. Thank you very much. (applause)

PRESIDENT: Thank you, Mr Yates, for presenting such an excellent paper this morning. I would also like to thank Mr Plowden for permitting Mr Yates, his lighting expert, to present this paper; as well as Mr Dempster who showed the slides.

Gentlemen, I wonder whether you are aware that Mr Yates is the incoming President of SANCIL. We would like to take this opportunity of wishing him the best of luck and a very successful year of office. (hearty applause)

PRE-LUNCH SESSION (Friday, 26th May, 1972)

PRESIDENT: Gentlemen, since we have only three hours in which to complete three forum sessions I would suggest that each session be limited to an hour so as to give each branch sufficient time to discuss the matters put forward.

We will then start the Highveld Branch Session immediately by handing over to our Quizmaster, Mr. Botes, who is also the Chairman of the Highveld Branch.

QUIZMASTER (P.J. Botes): Dankie, mnr. die President. Met die verandering in die aanbieding van die ledeforum wil ek net graag poog om almal wat praat aan die woord te stel, maar ek wil graag hê dat hulle so kort en saaklik as moontlik sal wees tensy daar nie baie tyd gaan wees nie.

Vraag 1: GEMEENSKAPLIKE DIENS FASILITEITE VIR VOORSIENINGSOWERHEDE EN

POSKANTOOR: In die lig van goedkeuring deur die Verenigde Munisipale Bestuur van die aanbevelings vervat in die memorandum in dié verband, van die VME0, is daar enige onderneming wat besonderhede kan verstrek sover dit die praktiese toepassing betref van die gemeenskaplike diens fasiliteite?

Soos mnr. Theron gemeld het, dek dit 'n baie wye veld en ek dink dus om dit ietwat te kondenseer moet ons ons bepaal by die installering van kables, staal- en beton waterpype of poskantoor pype; of dit net behels die installering van elektriese kables en poskantoor kables; op watter basis die koste verdeel word as daar enige basis is waarop dit gewerk word, en water knellende probleme ondervind word.

Miskien wil mnr. Theron op hierdie stadium 'n woord sê.

G.C. Theron (Vanderbijlpark): Mnr. die Vraesteller, soos ek gister gesê het, is dit 'n bietjie moeilik om hierdie vrae te antwoord want dis nie iets spesifiek wat hier genoem word nie.

Na aanleiding van 'n koste-verdeling soos u nou genoem het: dit was uiteengesit op bl. 2, item 3 punt 4 in die Gebruikskode wat verlede jaar

beskikbaar gestel was.

Dit is natuurlik 'n voorstel tussen die Poskantoor en die plaaslike overhede en indien daar probleme mag wees, moet dit uitgestryk word op daardie vlak; want dit hang af van die omstandighede in elke plaaslike overheid en of dit gaan verskil van gebied tot gebied.

Die ander vraag wat u nou geneem het - of die Poskantoor installasie net kabel behels en of dit kabel en pype behels: dit hang af weer van wat die vereistes van die Poskantoor mag wees vir daardie spesifieke gebied. Dit mag die uitgrawings insluit vir pype en vir hoof telefoongeleiery, of dit kan net vir plaaslike distribusie wees wanneer dit gewoonlik net die ver van kabela aanneem.

In ons eie proefneming wat gedoen was oor die laaste twee jaar, het dit tot dusver nog net die kwessie van kabela ingesluit; dis elektriese kragkabela wat gelê word in dieselfde sloot as die Poskantoor verspreidingskabela vir residensiële gebiede.

Waar dit wel op Poskantoor hoofverbindings afgekom het waar hulle gewoonlik pype vereis, daar het hulle op hulle eie inisiatief dit gedoen aangesien die reserwe wat daarvoor toegeken was nie aangrensend aan dié van die kragkabela was nie en daar was 'n gemeenskaplike voor nie prakties nie.

Dankie.

VRAESTELLER: Dankie, mnr. Theron. Daar is 'n tekort aan fondse met die Poskantoor soos ons Plaaslike Bestuur ook by tye ondervind in verband met die program. Het u miskien die probleem ondervind waar hulle eenkeer gewillig is om saam met ons te werk met die retikulering van 'n dorpsgebied en die ander keer weer voorgee dat hulle nie die fondse daarvoor het nie?

G.C. Theron (Vanderbijlpark): Nee, mnr. die Vraesteller, ons het dit nog nie ondervind nie. Ons het oor die laaste twee jaar drie dorpsgebiede gedoen onder die skema. In elk geval het ons op tender uitgegaan met die kapitale werk van die elektriese installasie en die Poskantoor se vereistes vir hulle deel bygevoeg as 'n onderdeel van die gesamentlike tender. Wanneer die aanbieding ingekom het, is dit dan aan hulle voorgelê met ons aanbeveling

watter tender die plaaslike owerheid gaan aanvaar en hulle was nog altyd bereid gewees om dieselfde tenderaar aan te neem. Dit is 'n vaste eenbedrag tender.

Wat die installering van die aansluitings-pype na die individuele huise aangaan, is in ons geval ook nog nie 'n probleem nie. Ons kry 'n oep bestelling van die Poskantoor vir 'n honderd huise en ons voersien self die 20mm geleierbuis wat ingaan saam met die huiseaansluitingskabel. As die huise klaar gedoen is, kry hulle net 'n rekening daarvoor en seker dit ons aangaan is dit eintlik die end van die storie. Dankie.

VRAESTELLER: Baie dankie, mnr. Theron. Is daar nog iemand wat miskien iets wil bespreek in die verband?

I.H. Hess (Cape Town): Mr Quimaster, since not many towns have done schemes in conjunction with the Post Office yet, our experience may perhaps be of some help. We have only tackled municipal housing schemes as yet which makes it somewhat easier.

Recently we completed a 240 house European housing scheme very successfully. We do our own laying of cables and in this case we prepared estimates for the whole job in conjunction with the Post Office and allocated a certain proportion to them. Once these had been approved by the Post Office we then went ahead with the job. So far we have had no instance where they have actually refused to allow us to go ahead with the work and it has worked very well indeed.

We did encounter one difficulty which I have referred to Mr Theron and this was with the 20mm or 25mm pipe from the boundary to the house. This particular scheme being a Council one, we put in these pipes at the Council's cost. The arrangement we had with the Post Office, however, was that they would provide this piping and we would then install it at the same time as we installed the service cable. We add 50c to the cost of the service cable just as a handling charge.

Now apparently there's been a directive from Pretoria that the Post Office is not going to provide this piping and this is something we now have to resolve.

We've/...

We've gone a little further in other respects which I think are worth noting. For instance, where the Post Office have gone into major schemes for the laying of cable in existing areas, they've approached us about putting our overhead cables underground at the same time, and vice versa.

QUIZMASTER: Thank you very much, Mr Hess. There seems to be quite a bit of co-operation between the Post Office and the Local Authority in Cape Town.

W. Bozyczko (Estcourt): Mr Quizmaster, both in Edenvale and Estcourt we have co-operated very satisfactorily with the Water Department in the laying of our cables. I find the administrative side much less involved than it would be with the Post Office. Thank you.

QUIZMASTER: Thank you, Mr Bozyczko.

I might just mention that in Roodepoort the Water Department is responsible for digging the trenches, the Electricity Department takes over after the pipes have been laid, laying the cables, and the Post Office Services is then responsible for filling up and doing the maintenance thereafter.

E.E. de Villiers (Rustenburg): Mnr. die Vraesteller, ek weet nie hoeveel van die lede ervaring het van die saak waar dit nywerheidsgebiede betref nie. Ons is tans besig met die benetting vir al die dienste in 'n grensnywerheidsgebied in Rustenburg.

Veer die laaste kongres in Kaapstad het ons reeds onderhandelings gehad met die Poskantoor. Al ons planne was aan hulle voorsien, samesprekings was gevoer en ons het op 'n basis van koste-verdeling gekom wat vir die Poskantoor aanvaarbaar was. Ek kan vir u maar noem, dit is op 50% van die uitgrawingskoste en die leggingkoste van ons basiese hoogspanning 11kV kragkabel met hulspype wat die Poskantoor self voorsien.

Ons het dit oorweeg om ook sekere van die ander dienste in te sluit, maar dit kon nie prakties uitgevoer word nie. Die maak van paaie en stormwater

dreinerings is onder 'n aparte buite-kontrak uitgegee. Spoorlyn fasiliteite is weer 'n ander kontrak. Ons Siviele Stadsingenieursdepartement doen dan die water en riolering en my departement dié hanteer die elektriese aanlegte tesaam met die Poskantoor se hulspyp. Dit is miskien ook interessant dat hulle wel besluit het dat geen Poskantoor kables word direk gelê nie, alleenlik hulspyp waardeur hulle later die kables gaan trek.

Laasgenoemde is 'n plastiese pyp en ek mag net noem dat die eerste hoeveelheid pyp wat hulle voorsien het, was van 'n baie swak tipe gewees. Hulle kon toe dadelik die probleem insien dat daar 'n moontlikheid bestaan dat die pyp gaan platgedruk raak en dié was toe verander.

Die Poskantoor het ook vir ons gevra of ons nie maar ook sou onderneem om hulle kables langs roetes waar ons nie eintlik kragkables gaan lê nie, sal doen nie, maar ons het gevoel dit is darem te vergesog. Hulle het toe onderneem om dit dan self te doen. Waar daar gekompliseerde padkruisings is, het hulle ons al die tyd bygestaan.

U sal kan verstaan, in so 'n dorpsgebied het 'n mens heelwat probleme, veral met stormwater dreinerings. Ons het, in elk geval, die saak op hierdie wyse opgelos en dit vlot nou baie goed.

VRAESTELLER: Baie dankie, mnr. de Villiers. Op hierdie stadium gaan ek nou die bespreking hiervan kortknip want dit is eintlik meer 'n huishoudelike aangeleentheid van 'n munisipaliteit.

Question 2: S.A.B.S. SUB COMMITTEES ON DRAUGHTING AND REDRAUGHTING OF SABS SPECIFICATIONS:

In the past the actual function of the SABS Sub Committees, dealing with draughting of new specifications and amendments to existing specifications, has not clearly been defined. Could this matter be discussed with the object of perhaps the formation of a specifications working committee at each branch for discussions and probable urgent decisions re new specifications and amendments ?

As mentioned yesterday, I've been instructed, as Co-ordinating Representative of the AMEU, to draught a standard practice instruction describing the

conduct of the representative and alternative appointed to the sub committees. I would be very interested to hear members' views on the establishment of working groups in other centres, after which I shall call on Mr Pat Middlecote to comment on what has been said.

K.W.J. Halliday (Port Shepstone): Mr Quizmaster, we of the Natal Branch do feel it would be a good thing to have a branch committee working on this matter. As we all know, the circulars that we are sent from time to time do tend to get mislaid on our desks but by means of the working sub committees we could far more readily gauge the feelings of all the members.

QUIZMASTER: Thank you, Mr Halliday. Could we now have some comments first from the Cape Western Branch and then perhaps the Cape Eastern.

H.C. Dreyer (Paarl): Mnr. die Vraesteller, die probleem wat ons ondervind in die Kaap is dat die standaarde wat van toepassing is in die binneland, nie altyd aanpas by die klimaats-omstandighede, hoogte oor seevlak ens. wat van toepassing is by die kus nie.

'n Ander probleem wat ons ondervind is die skakeling tussen die SABS en die optrek van spesifikasies. Weens die feit dat ongelukkig nou is die SABS kantore geleë in Pretoria, is dit baie moeilik vir die Kaap en die kusstreke om hierdie vegaderings te kan bywoon. Hierdie idee van 'n komitee in elke geweste sal moontlik daardie probleme kan uitkakel.

Ons sal dit beslis in Weskaap aan die gang gaan sit en ons hoop dat ons dan in die vervolg meer seggenskap sal hê by die kommentaar van spesifikasies. Dankie.

K.J. Murphy (Cradock): Mr Quizmaster, I'll put this to the Cape Eastern Branch at our next meeting but I think that such a move would be welcomed.

QUIZMASTER: Thank you, Mr Murphy. I must just point out at this stage that we don't intend to establish a working group for every specification but only for the ones of vital importance to municipalities, or if a

particular/...

particular branch should wish to do some work on a specific specification.

S.G. Hanceck (Technical Sub Committee Chairman of the Association of Electric Cable Manufacturers): Mr. die Vraesteller, ver-skeen my as ek in Engels praat want my Afrikaans is nie te vlot met tegniese besprekings nie!

Mr Quizmaster, we have two most excellent representatives of your Association on the SABS Cables Committees but unfortunately they both come from adjacent municipalities in the Transvaal and it may well be that they do not receive in good time the views of the more distant localities and branches. I think this would therefore be a very good proposal if your branch committees could consider cable topics which are certainly of vital importance to practically all municipalities, and could send back a consolidated comment to the representatives on the SABS Cables Committee.

In this way a far wider spread of information in the General Cables Committee will result and, if they were to liaise with the local cable manufacturers in good time, it would give us a far better chance of discussing problems meaningfully in our own Technical Sub Committee within the Association.

If this mechanism could be put into effect we will get a far better and quicker service in the best interests of everybody. Thank you.

QUIZMASTER: Thank you very much, Mr Hanceck. Will branches please take note of Mr Hanceck's request.

A.F. Turnbull (Vereeniging): I think that if the AMEU is to be represented on these committees it is essential that some liaison is had with the branches. I am a member of some of these committees and we find that with the present way of working it's virtually impossible to get the views of members in the outlying areas who are possibly more interested in the specific item than the members closer at hand. I strongly recommend a closer association.

QUIZMASTER: Thank you, Mr Turnbull. I think one of the problems with the liaison/...

liaison is that some of the branches only meet once in 3 months and others, once a year.

C. Lombard (Germiston): Mr Quizmaster, could we have some clarity on this issue. As I see it, the proposal is that draught specifications or amendments to specifications will now be circulated to various branches for comment. Are these comments then to be submitted direct to the SABS Sub Committee or to the representative of that committee and what will happen if there should be opposing views?

QUIZMASTER: Mr Loubser, it is intended that the information be fed back through the co-ordinating representative who will refer it to the appropriate SABS committee. Clarification on this point will come about once the Standard Practice Instruction has been circularised.

I will now call on Mr Middlecote to add his views.

A.A. Middlecote (SABS, Pretoria): Mr Quizmaster, we of course will welcome this because, as I shall point out this afternoon, we want the opinion of everyone and not just that of one area of the country.

Where there are very important projects such as the Code of Practice for Wiring of Premises we have, in fact, formed committees in Cape Town and Durban, the chairmen of which sit in on the main committee meeting with their opinions. We'd love to do this in every case but obviously the expenses become rather enormous.

Practically speaking, I think a working group is the only way. We tried to do it by correspondence with the IEC committees but most people tend to neglect paperwork until it is too late. The only way to get results is to have a small working group with whom you can keep in close communication by telephone if necessary. By means of these small self-appointed working groups at least you get a good sample of the opinion in the different branches and we can help you with extra copies of documents.

I repeat again that you must judge the importance of the project and

there's no reason why you shouldn't have 2 members on the specification committee with 2 alternates if you should wish to ensure a good, balanced opinion on any particular issue. These two could then ascertain the consolidated opinion of the branch. This is something we would welcome.

QUIZMASTER: Thank you, Mr Middlecote.

In reply to Mr Lombard's query on conflicting views: these will go back to the Main Committee to sort out.

Question 3: THE USE OF MINI-SUBSTATIONS FOR THE RETICULATION OF NEW TOWNSHIPS AT A DISTRIBUTION VOLTAGE OF 11kV

With mini-substations now being pretty well used all over

the Republic it would be interesting to hear what the experience of members are with regard to the use of these substations, especially on a distribution voltage of 11kV.

For economic reasons it is advisable in domestic mini-sub reticulation in this country to use the smallest conductor size of cable permissible.

However, the only suitable protection for such an installation is by means of HRC fuses where high fault current is encountered.

We also have the use lately of resin-encapsulated 11kV isolating switch-gear operated on a single pole unit and others, as a 3-phase unit. Some of these isolators house HRC fuses and we'd like to know whether there are any problems attached to this type of reticulation.

H. Barnard (Brakpan): Mnr. die Vraesteller, Brakpan gebruik nou al 'n hele rukkie lank mini-substasies van verskillende groottes vir verspreiding van krag. Daar is egter net een probleem wat ons ondervind het en wat ek miskien net wil noem vir u sodat u dit in gedagte kan hou wanneer u mini-substasies bestel of ontwerp. Wat ek bedoel by ontwerp is die toerusting wat u in die substasies gaan insit.

Ons het eens op 'n stadium een van hierdie sekeringstipe skakelaars in die mini-substasies geïnstalleer, maar ons het gevind dat die ding heel gevaarlik

is want jy kry nie hulle maklik afgeskakel in geval van nood nie. Die rede daarvoor is dat jy met die drie-fases een-een doodmaak deur die sekering uit te trek. Jy kry natuurlik ook die geval waar een van die sekeringe blaas en die transformator dan op twee fases loop in plaas van drie, en jy so 'n ongebalanseerde vraag het waar jy die drie-fase verspreiding doen.

Die probleem wat ons destyds ondervind het met hierdie skakelaar was 'n geval waar daar 'n noodlottige ongeluk plaasgevind het, en op advies van die fabrieksinspekteurs het ons destyds besluit om nie meer hierdie skakelaars te gebruik waar jy nie die ding onmiddellik kan afskakel, of waar daar nie ten minste drie-fase afskakeling gelyktydig plaasvind nie.

Verder het ons probleme ondervind wanneer dit kom by die installering van die mini-substasies. As jy nie voorsiening maak vir verwyderbare deure aan die kabelkante nie, dan vind jy dat jy moet jou kabels almal oopgrou. Veral waar jy direk van die mini-substasie af voer na die huise toe, beteken dit dat jy moet elke keer die hele sloot oopgrou, asook die grond onder die mini-substasie uitgrawe. Met hierdie verwyderbare deure en die onderste struktuur is dit egter nie so 'n groot probleem nie.

Nog 'n probleem wat ons ondervind het met die koop van plaatmetaal mini-substasies is dat hulle baie gou roes. Ek dink die SABS kan dit oplos deur 'n streng spesifikasie te hê vir die onderlaag vir verf van die mini-substasies. Dankie.

VRAESTELLER: Baie dankie, mnr. Barnard. Die SABS is besig met so 'n spesifikasie en ons hoop ons sal dit binnekort gesirkuleer kry.

E.E. de Villiers (Austenburg): mnr. die Vraesteller, ek dink die meeste van ons hier ken hierdie tipe van verspreiding al baie goed oor 'n hele aantal jare en gebruik dit ook reeds moontlik oor 'n paar jaar.

Ons gebruik ook wel hierdie sekeringstipe 11kV skakeltuig in die mini-substasies en het een of twee probleme gehad as gevolg van kondensasie van vog,

veral/...

veral in die goeie reënseisoen wat ons onlangs gehad het. Ons het dit heeltemaal te bowe gekom deur 'n tipe "hard-setting foam plastic" onder die skakeltuig gesit op grondvlak, van moontlik so 3" of 4" dikte. Dit keer dan alle vog om in daardie kompartement in te kom wat die kondensasie veroorsaak.

Die kwessie van die montering van die substasie en die installing van kables mettertyd na mate jou stelsel vorder, het ons op dieselfde wyse skynbaar as mnr. Barnard te bowe gekom deur 'n baie stewige voetstuk op 'n fondament diepte van omtrent 'n meter onder die mini-substasie te lê. Dan kan jy ter enige tyd soveel rondom hom grawe soos jy wil, en jy sal hom glad nie steur nie. Dankie.

H. Barnard (Brakpan): Mnr. die Vraesteller, daar is iets wat ons nog op hierdie stadium oorweeg. U weet met die standaardisering van mini-substasies is die basisse van hulle almal ongeveer ewe groot. Ons ondervind baie moeilikheid om die siviele ingenieurs wat geweldig besig is, te kry om vir ons hierdie konkrete fundasies te kom gooi.

Is daar nie een of ander munisipaliteit wat dit oorweeg het nie en miskien ondervinding daarvan het om hierdie konkrete basisse in voorafgevormde of gegote sementblokke aan te koop en dit so te installeer nie?

VRAESTELLER: Dankie, mnr. Barnard. Ek kan dit net noem dat ons in Roodepoort 'n vorm het wat ons net neersit, en dan gooi ons hom vol konkret sommer self!

D.H. Fraser (Durban): In connection with the last question, we in Durban have for some time now been using a precast concrete slab. This is carried with the mini-sub and placed in position and has greatly speeded up the whole operation.

The use of mini-sub's in Durban dates back quite a few years now and we've got several 'breeds' of this 'animal', starting off originally with a metal compartement for the HV and LV switchgear and fusegear. This caused us quite a lot of concern and great pains were taken to guard against/...

against corrosion. But we saw in the long term that this could lead us into a lot of maintenance problems in our particular environment and I think it is true to say that Durban took a lead in the development of the glass fibre compartment. This we feel will ensure that these units give us long and satisfactory service with relatively little maintenance.

One of its major advantages, of course, is the speed of erection by comparison with that of the brick substation which was formerly our standard. The latter held up the works considerably and the costs were climbing at an alarming rate. All in all, it was a development which we regarded as a godsend.

Our standard is a 300 KVA unit. The transformer compartment is designed on this basis, but where we specify a smaller transformer size we specify the dimensions such that it will take the 300 KVA unit if the transformer has to be increased in capacity. It is not then necessary to disturb the cable connections to the substation. Thank you, Mr Quizmaster.

QUIZMASTER: Thank you for your comments, Mr Fraser. Anybody else?

C. Lombard (Germiston): Mr Quizmaster, I don't know whether I qualify to comment on this because we only have a secondary system of 0,6kV and not the specified 11kV one. However, there are a few points I'd like to make.

Firstly, where you have mini-subs incorporating ring main units providing single phase switching, I think it's advisable to bear in mind that you have to be very careful when you do switch in a cable with a transformer connected at the remote end because you can get ferro-resonance conditions arising which you must take precautions against.

Secondly, where your ring main board incorporates HRC fuses, it is advisable only to use a fuse rating to provide fault protection and not overload protection. This is because it is not advisable to run these fuses anywhere their rated value.

Thirdly, as far as the finish of mini-subs is concerned, I personally don't

think/...

think the provisions in the draught SABS specification are going to be acceptable to many of us. We find that these mini-substations are the favourite haunts of children who clamber all over them. This leads to scratching of the surface and subsequent corrosion.

We specify that the metal must be cleaned and zinc sprayed before the final coats are applied and I think we'll stick to that. Thank you.

QUIZMASTER: Thank you, Mr Lombard. That's a very good point.

K.G. Robson (East London): I wasn't really intending to speak, Mr Quizmaster, as I was hoping somebody else would ask how much the reticulation is costing.

In support of Mr Lombard I must say that our first reaction to the SABS draught specification was that we certainly would oppose it as well.

However, I understand that it is to be sent out for further comment.

We in East London have been using for some time a three-phase protection on all our mini-substations. As it's undulating country our costs are, I think, appreciably higher and I thought I might stick my neck out by quoting some of them.

With fibre-glass kiosks and streetlighting conforming as closely as possible to the SABS code, we seem to be coming out at somewhere between R600,00 and R700,00 per normal size erf. Naturally this varies.

However, we've had very satisfactory experience with the three phase protection. It is not limited merely to residential areas but can also be used where you've got commercial loads.

Our policy is not to use miniature substations for industrial consumers at all as it seems more advisable to use the conventional type substation.

Although our kiosks are slightly larger than the normal type, they seem to blend well into the natural surroundings and are not unsightly.

QUIZMASTER: Gentlemen, we have with us Mr Stummeyer who is a visitor from

Germany and a designer of resin-encapsulated switchgear. I'm sure he will have some interesting information to impart to us.

K. Stummeyer (A.E.G.-Telefunken (Pty) Ltd): Mr Quizmaster, gentlemen, it might be of interest to you to hear something about our experience with mini-substations in Germany. Mini-substations have been in service in all German cities since 1961 and it is important for technicians to know something of the kind of troubles experienced in these mini-substations.

First let me say that the networks in Germany have a service voltage of 10kV to 12kV and in a certain part, 20kV to 24kV. The impulse test voltages are 75kV, 95kV and 125kV.

Most of the troubles in these mini-substations result from material faults, fuse faults and faults in cable endboxes. Nevertheless, many thousands of these stations are in service and the fault rate does not exceed 0,5%.

There are the same kind of troubles in the normal air-insulated installations. Fuses, however, have their own particular problems and it is important to realise that protection by means of a fuse is not the same as that with a circuit-breaker of a special protection relay. Unless you know the special details of fuses you should not protect the circuit with fuses.

An important manufacturer of fuses makes the following recommendations for high voltage fuses: "It must be noted that excessive overload currents of long duration are causing difficulties due to the extended melting time of the fuse element. The heat that is created in the fuse could damage or destroy the tube of the fuse. To avoid such overloads the following possibilities exist: -

- a) under normal service conditions the current passing through the fuse should be approximately half of the overload current that can be expected;
- b) to avoid a terminal overload of the high voltage fuse e.g. by earth leakage currents, the overload isolator can be equipped with an overload protection with fixed current settings."

We find in Germany that it is important to know the special characteristics of fuses.

We also have special epoxy-resin insulated switchgear both 3-pole and single pole operated. The electrical suppliers in Germany prefer the 3-pole operated system but the most important suppliers, the RWWE, have installed single-pole operated switchgear for many years. We find, though, that both systems have advantages and disadvantages, but the experience with both systems has been good.

I hope I've been able to communicate some details to you. Unfortunately my English is not so good and it is very difficult to speak on such a subject in a foreign language. I thank you very much. (applause)

QUIZMASTER: Thank you, Mr Stummeyer, for a most informative contribution.

Gentlemen, I'm sure you will agree that there is a need for a symposium on mini-substations and we must see what we can do to arrange this.

I think we will omit Question 4 as I think that Question 2 under the Affiliates Session is of more importance to us.

Affiliates Session: Question 2:

That the expedient of expecting 20 to 30 amp. sub-circuit protection to protect flexible cords of one tenth the cross sectional area and appliance faults has not proved completely effective can be seen possibly in the fact that statistically electricity is the highest know cause of fires in the Republic. (20 per cent excluding a proportion of "unknown causes" with the predominance being in domestic homes and flats. (N.B.R.I. Report 62). (54 per cent)

Having in mind that a potential fire is a 24 hour safety hazard should not the principle and main reason for Reg'n 310 be extended and more accent be made in providing the protection for the region where it is more important namely, beyond the socket outlet, and individually protected

outlets/...

outlets called for if only in domestics and other premises such as hospitals, hotels, nursing homes etc., or where the public can be expected to foregather, and where a fire can be more serious in its consequences.

QUIZMASTER: Mr Hain, will you introduce this question please.

G.R. Hain (G.R.Hain (Pty) Ltd., Johannesburg): Mr Quizmaster, under present day practice flexible cords can burn up under certain and not uncommon conditions of fault current before the sub-circuit protection operates. This can be understood when one realises that a 100 amp fault of a $\frac{1}{2}$ sq.mm. flexible initiates a temperature rise of 200 degrees Centigrade per second. The extrusion or melting temperature of PVC is 160 degrees Centigrade and the tripping time of a standard 30 amp circuit-breaker under these conditions can be anything from 2 to 12 seconds.

This could also be the reason for unexplained fires in homes while owners are away as very few consumers isolate reading lamps, fridges, wirelesses etc., at the outlet, and invariably flexes feeding these appliances are alive continuously.

As mentioned in the question, electricity is statistically the highest known cause of fires in the Republic, the bulk being in domestics. From the period 1957 to 1962 the average casualties were as follows:

53 per year - fatal

58 " " - non-fatal

In quoting these figures the National Building Research Institute Report states:

"These figures are only for areas where fire services are available, and do not take into account deaths arising subsequent to the fires and resulting from injuries received therefrom."

In fact, the figure may be 5 to 6 times as high.

In terms of safety the question of providing earth leakage protection, the minimum provision of outlets and protection of flexible cords are inter-

related/...

related and are common in that they cater for protection beyond the outlet where most faults occur. A fundamental rule of cable and conductor protection recognised internationally and included in all overseas wiring regulations, is that any drop in conductor section or current carrying capacity must be catered for at the drop by additional protection rated to suit the smaller conductor. Due recognition of this can be seen in our own Regulation 206, together with the definitions of circuit, sub-circuit and installation, although the wording is certainly not very explicit.

In practice the rule is followed up to the socket outlet in protecting fixed wiring, inaccessible and well-protected mechanically. At this point, however, a drop in current carrying capacity from 30 amps to 2 amps is accepted without suitable protection being provided. This transgresses a fundamental and the position will be aggravated further with the use of special light-weight cord rated at $\frac{1}{2}$ amp now envisaged for soldering irons in our compulsory standard specification for flexible cords.

To an argument expressed that the occurrence of fires and burning flexibles is small, can be expressed an equally valid counter-argument that fires and electrocution caused by fixed wiring are even less. If safety is the prime concern, then the greater cause - protection beyond the outlet - should receive prior consideration.

Costs are of importance and justify comment. From figures submitted by the Department of Statistics the average unit cost of 18 256 homes built in the Republic in 1971 was R12 250,00; and for the 10 436 flats, R7 560,00. Assuming we install as a minimum 15 protected outlets as legislated for in the Scottish Building Regulations which lay down 4 in a kitchen, 4 in a lounge and 2 in each bedroom, the complete cost would be anything from R40,00 to R80,00. (It's rather interesting to note that the American and Canadian Wiring Regulations call for a socket virtually at every 12' of wall length.)

Bearing in mind the environmental conditions of flexible cords subject to all forms of disturbance and mechanical damage under wall-to-wall carpeting,

this figure is not high, particularly when related to the fact that it provides complete protection in the vulnerable region beyond the outlet. If taken over the life-span of a home, it is good insurance.

A view can also be expressed in this respect that an unbalance exists in the relationship of cost against protection provided on fixed wiring legislated for in by-laws and regulations, as compared with costs to protect beyond the outlet.

Electricity is usually the first to suffer in any cost-pruning operation which, when considering its usefulness, is unsound in principle. If safety is the prime concern of regulations, hazards existing under present day practice should, I think, be gone into. I thank you, Mr Quizmaster.

J.V. Grant (SABS, Pretoria): Mr Quizmaster, we're not sure really how many of the fires in these electrical accidents are due to cords but undoubtedly statistics from overseas do show that these are fairly high causes of fires, particularly in domestic houses.

The whole problem is a matter of balancing your safety against economics, and safety is a matter of probabilities. The Wiring Regulations Committee is looking at this problem with regard to an amendment and certainly to bringing this into the picture very much more in future Wiring Regulations.

Looked at from the engineering point of view, it seems only sensible that one should protect the flexible cord at its source i.e. either in the plug or at the socket outlet. I can't really say one thing or the other here today as this whole matter of probabilities and economics has to be left to the decision of the Committee.

The question of the number of socket outlets to be fitted in domestic houses gives rise to a number of problems. We carried out a survey on this and got a really mixed bag. Quite a lot of people had suggestions; others said they didn't want it in the Wiring Regulations and others said nothing at all. So really we haven't got anywhere on that problem. The Wiring Regulations Committee is looking into the fact as to whether or not this really should come into the Wiring Regulations and, if so, what is to be done about it.

One of the major stumbling blocks is sub-economic housing. The various people I've talked to say they just cannot afford to put in more socket outlets.

We discussed earth leakage protection yesterday. If this should come in as a compulsory regulation of course, it would cover part of the protection of the flexible cord and the appliance fixed to the end of it. But there still remains the possibility of shock from contact with the two live wires and, of course, fire due to the fusing of two-core flexes.

I think Mr Prins has something to say about the very small flex so I'll leave that to him.

I would just like to mention that overseas in the National Electric Code in the United States they give recommended sizes of flexible cord for use on certain sizes of circuit i.e. for protection of 20 amps, you should use a certain size of flexible cord. However, this can only be a recommendation and that's all it is. As long as one can go into any electrical wholesaler and buy ripcord people are going to use it because it's cheap. So either you have to think in terms of protection of the cord that is available or you have to eliminate the cord that is unsuitable i.e. eliminate it from sale to the public.

They've looked at this problem in Australia and make recommendations for the sizes of cord to be used with certain sizes of protective device. Again, though, it's only a recommendation.

They are fortunate in a way in that they've limited their appliances to kilowatts and all their socket outlets are 10 amps. They do of course have larger ones but these are run in special circuits for 15 amps. Over 15 amps they have to be fixed appliances, again with a special circuit.

We are landed at the moment with everyone designing appliances right up to the limit of 15 amps which is unfortunate. So we've got the 3 kw plus and I don't think we can do much about this from the point of view of circuit design because it would be very desirable to reduce our 30 amp

circuit/...

circuit to less protection - 20 amp or 25 amp protection - but I can't see that we can do that.

If taken over the life-span of a home, it is good insurance. I'd like to finish by saying that the Wiring Regulations Working Group is looking at the whole problem and we hope they will come up with something really useful in this respect in the future. The thing to bear in mind is that protecting the cord will help with fire risks and this can be done either in the socket or in the plug. Thank you, Mr Quizmaster.

QUIZMASTER: Thank you, Mr Grant. Is the probable answer to the problem not to enforce the installation of more plug points per installation to eliminate cords?

F.J. Prins (SABS, Pretoria): Mr Quizmaster, unfortunately in every house you have appliances and to feed these appliances you must have flexible cord. On the Continent the smallest size allowed is 0,5 sq.mm. for light-duty cords, and for normal duty, a minimum of 0,75 sq.mm. We in South Africa have become spoiled with the old 140076 which is only equivalent to 0,39 sq.mm.

As some of the older members will recall you won't find mention of this in the old quality specifications because initially the old cable committee actually outlawed 140076 because of the abuse that it was put to.

We have even found extensions to plug-in stoves done with 140076 and only the other day I witnessed a lady buying some to replace the flex for her iron simply because it was the cheapest sold over the counter.

To come back to the light-duty flex (0,2 sq.mm.): there again we have to blame B.S.I. Before metrication they allowed a 70076 which was not even covered in any of their specifications specifically for the small soldering irons used in the electronic trade. The 0,2 sq.mm. was introduced in our specifications because Britain in their new metric specifications actually did come and cover that size, ostensibly only for that use. Since we can't exactly throw it out, I would personally like to see that it is only used for that purpose. Mr Hain raised quite a valid point because already we have been pestered by commercial people wanting to utilise it for small record

players, small electric toys and such like. This is just asking for trouble.

We know that in Great Britain they have more or less provided a means of catering for this by fusing the plugs. You put in the correct size fuse for your final loading. However, that is an aspect that Mr Grant and his Committee will have to sort out.

All I would like to say at this stage is that I personally don't feel very happy about the fact that we were forced to cater for that 0,2 sq.mm.

Lastly, the new draught metric specification for safety cords was published in the Gazette on April 14th. We only gazetted the actual specification but because we found so many people had difficulty in interpreting it, we have since produced a second part which goes into detail about every type of cord and its application. This is obtainable separately from the Bureau itself and is very similar to the recommendations given by the Australian specification.

QUIZMASTER: Thank you very much for the information, Mr Prins.

J.E. Heydenrych (Middelburg): Mnr. die Vraesteller, daar is voldoende rede vir die insluiting van hierdie vereiste in die standaard regulasies wat nou deur die Buro opgestel word, omdat die sokuitgang deel vorm van die vaste installasie, veral die kontakte in daardie sokuitgang.

'n Aspek wat miskien nou nie gedek is hier nie, is dat behalwe die brand gevaar is daar ook die kwessie van die misbruik van die vermoë van die sokuitgang wat op die oomblik tot 'n maksimum van 15 ampere beskerm is. Die stroombaan tot by die sokuitgang is beskerm tot 'n vermoë van 30 ampere miskien, en niks verhinder die verbruiker om 'n toestel van 20 ampere in daardie sokuitgang te gebruik nie. Ek dink nou spesifiek aan speistoestelle. Dankie, mnr. die Vraesteller.

A.J.G. Gosling (Brian Colquhoun, High O'Donnell & Partners, Braamfontein):

Mr Quizmaster, I'd just like to mention that I've actually experienced a cord burst into flames as the result of a failure just outside the plug.

On actual examination I found that the insulation on the phase wire and that on the neutral wire had failed and the earth wire was insulated. They had an earth leakage relay on the system which would have operated had the earth wire not been insulated.

I think, therefore, that serious consideration should be given to the use of three cords with the earth wire insulated.

QUIZMASTER: Thank you, Mr Gosling. That's a very important point.

K.J. Murphy (Craddock): Mr Quizmaster, the emphasis has been on the starting of fires and the protection that may be had by having a circuit breaker in the socket. In actual fact it would take a very small current of the order of about 1 amp to start an admirable fire and I don't see that we're going to stop all fire by this means. Thank you.

H. Barnard (Brakpan): Mnr. die Vraesteller, ek is heeltemaal ten gunste daarvan dat ons die beskerming moet aanpas, maar ek wil net waarsku dat ons nie te ver moet gaan daarmee nie. U weet baie van hierdie sporadiese stroomverbruikers wat ons het soos 'n sweismasjien of iets van die aard, gaan vir u probleme lewer as u miskien 'n skakelaar in so 'n stopkontak uitgang installeer wat te fyn ingestel is. U sal vind dat baie huiseienaars wat teenswoordig sweismasjiene van 'n ligte aard gebruik, sal dit nie kan gebruik nie want daardie beginstroom wat jy het is baie hoër as die vermoë van die breker.

Die ander ding wat my ook pla is dat wanneer u 'n toestel aan daardie sok koppel, bestaan daar nog die moontlikheid dat jy jou huis aan die brand kan steek in 'n 100 tree van die dun buigbare koord wat in enige kettingwinkel verkoop is, weens die taamlike weerstand in daardie draad. Daardie probleem kan jy dus nie heeltemaal uitskakel nie.

Mnr. die Vraesteller, dan wil ek die President vra net voor hy afsluit vir ete of hy my net vyf minute sal gun. Ek wil net iets in verband met die notules van hierdie vergaderings sê, asseblief.

VRAESTELLER: Baie dankie, mnr. Barnard. Here, ek persoonlik voel nog dat een van die groot probleme wat ons het is natuurlik die onnodige koorde wat

orals in 'n huis gelê word. Ek het al gesien in hierdie „spec buildings“ dat daar net een of twee kontak sokke voorsien is in 'n hele huis, en word die koorde vanaf die sitkamer dwarsdeur die huis na die slaapkamer gelê. Dit lyk my die tyd kom aan wanneer ons die bouers sal moet forseer om 'n sekere minimum sokke daar te stel.

Is daar enige verdere bespreking ?

C. Lombard (Germiston): Mnr. die Vraesteller, ek glo nie dat ons ooit gaan wegdoen met buigbare koorde nie want mense gebruik nog altyd staan-lampe en dies meer.

Ek persoonlik is egter baie baie onhuts om nou te hoor dat daar gepraat word van 'n 0,2 mm en 0,39mm kode. Ek onthou 'n aantal jare gelede (en ek dink mnr. Prins sal dit ook onthou) dat daar 'n voorstel gekom het van plaaslike vervaardigers dat daar voorsiening gemaak moet word in die SABS spesifikasie vir 'n ligte koord vir stofsuikers. Ons het dit toe uitgegooi en ek dink ons moet dit ook doen met hierdie kode wat ook nou voorgesel is, want dit is 'n potensiële gevaar sover dit brand betref.

'n Tydjie gelede het ek 'n bietjie moeilikheid gehad met een van die maatskappye wat gas verkoop. Hulle het sekere statistieke van oorsee aangehaal en ook wyd gepubliseer: dat gas 'n baie veiliger voorsiener van hitte is in vergelyking met elektrisiteit. Ek het daarop gereageer want om statistieke van Amerika byvoorbeeld aan te haal en dit te gebruik as 'n verkoops-punt vir gas is mynsinsiens nie die regte ding nie.

Ongelukkig het ek nie syfers van statistieke van brande in Suid-Afrika beskikbaar gehad nie soos dié wat mnr. Hain nou juis aangehaal het. Ons moet dus op ons hoede wees vir hierdie tipe kompetisie. Dankie.

VRAESTELLER: Baie dankie vir u kommentaar, mnr. Lombard.

R.E. Friede (Mbabane, Swaziland): Mr Quizmaster, a few minutes ago you spoke about spec building and the dangers of having too few plug outlets. We are having to go into low cost wiring who have only just become able to afford electricity. Our biggest horror there is the use of electric irons

On actual examination I found that the insulation on the phase wire and from bayonet fittings meant for lighting.

These people cannot yet afford earth leakage circuit breakers and so we are telling the builders to install plenty of plug points.

The second point is mainly for manufacturers. Other than the Corner House, the Holiday Inn is the first installation I've seen which has fuse plugs.

When will these become available ?

VRAESTELLER: Thank you, Mr Geeling. That's a very important point.

E. de C. Pretorius (Petchefstroom): Mnr. die Vraesteller, ek wonder net of die grootste persentasie van die vermoedelike brande wat veroorsaak word deur buigbare koorde, nie vermy kan word indien die isolering van buigbare koorde van 'n brandvry materiaal is nie.

VRAESTELLER: Baie dankie, mnr. Pretorius. Is daar dalk iemand van die SABS wat kommentaar wil lewer oor die bydraes ? of enige iemand anders wat wil praat voor ons afsluit ?

S.D. Gluckman (Chemilite (Pty) Ltd., Johannesburg): Unfortunately the discussion on purification was abandoned. However, my company has brought out a comparison of the costs of having a transformer purified and not having it done. These have been handed out to everyone but it must be remembered that they are not actually catalogues of prices.

VRAESTELLER: Baie dankie, mnr. Gluckman

Baie dankie, mnr. die President, vir die voorreg wat ek gehad het om hier voor te sit en hierdie Hoëveldtak se Sitting waar te neem. (applous)

PRESIDENT: Our thanks to Mr Botes for a very successfully handled session. (applause)

Here, voor ons afsluit wil ek net graag u aandag vestig op 'n kennisgewing onder Regulasie C250 van die Fabriekswet vir mini-suba, en ook die vereistes ten opsigte van brandblussers soos vereis in Reg. C55 (1)(f) wat onder die gewysigde regulasies binnekort afgekondig sal word. Mnr. Wannenburg versoek dat ons die staatskoerante moet dophou om hierdie wysigings te lees wat van

toepassing sal wees op mini-substasies.

Gister het mnr. Wannenburg gevra, na aanleiding van die vrae wat gekom het in verband met draadwerk, dat ek moet vasstel hoeveel lede eintlik beskik oor die nuwe uitgawe van die Elektriese Draadwerkers en Aannemers Wet, en of hulle werklik weet wat daarin staan!

Mnr. Barnard wou graag iets te sê gehad het voor ons afsluit.

H. Barnard (Brakpan): Mr President, it's always been a source of worry to me that although we regularly hold technical meetings and conferences of the AMEU, that we often only receive the minutes of these together with the agenda for the following meeting.

As you all know, we are discussing very important points when we come together like this and we can't therefore make use of the information contained in these minutes.

I feel, therefore, we should request the Secretaries to have these minutes ready within a matter of three months or so after each meeting so as to give members the opportunity of making use of the information contained in them. Thank you.

PRESIDENT: Thank you, Mr Barnard. I'll ask Mr Ewing to explain to the meeting the procedure involved.

R.G. Ewing (Secretary): Mr President, thank you. We discussed this matter at some length at the Executive Council Meeting which preceded this Technical Meeting.

I must say at the outset that the greatest problem which faces us has been that of translation. Unfortunately we, as Secretaries, are in the hands, in the first place, of our very good friends who do our recording who also have other commitments and cannot produce their typewritten record of our proceedings at the drop of a hat, by any means.

The next procedure is that I personally edit the proceedings. This, too, takes a little time as obviously one has to give quite a lot of thought

to what goes in and what doesn't.

We then hand over the proceedings at that stage for translation. Here again, we are in the hands of our translator who is in full-time employment and we can't expect him to produce massive translations in a matter of days or even weeks. This is a considerable task.

Then, we all know what printers are like. Like everybody else today they are heavily committed, under-staffed and they have major problems to contend with. They have to fit our proceedings in with other commitments.

Over all the delays, I quite agree with Mr Barnard, result in the proceedings coming out shockingly late, and I use the word 'shockingly' advisedly.

As I say, we did discuss this at the Executive Council and some very good suggestions and decisions I think were arrived at. These will be given effect to and I hope that members will enjoy a quicker service in the future.

I can assure Mr Barnard and all members that we, as Secretaries, are very conscious that it is most desirable and necessary to get the proceedings into your hands as soon as possible. Thank you, Mr President.

PRESIDENT: Thank you, Mr Ewing. Does that satisfy you, Mr Barnard?

H. Barnard (Brakpan): Mr President, I'm sorry to have to talk about this again, but this is not quite the answer that I expected.

We are well aware of the problems Mr Ewing mentioned but what I want to know is what we are going to do about them.

He also mentioned that we are going to get these minutes sooner, but we want something more definite than that. How much sooner? Sometimes as much as a year goes by before we get this information and this I feel is excessive.

I should be the last to wish to lower the standards of this publication, but if we can't get a printer to print it, should we not rather have it Roneo-ed or something similar? I honestly feel we must make a real effort

about/...

about this matter once and for all. Thank you.

PRESIDENT: Mr Barnard, I can assure you that the Executive has made all the effort possible. If we can implement the decisions taken by them, I think I can guarantee that in future you will receive the Proceedings, Volume 11, in good time. Thank you, Mr Barnard.

ADJOURNED FOR LUNCH

AFTERNOON SESSION (Friday, 26th May, 1972)

PRESIDENT: Gentlemen, the next item on our agenda is a paper by Mr Middlecote. Pat Middlecote has been known to us for so many years that he needs no introduction to this Association. His contributions have always been valued by us and we look forward this afternoon to hearing what he has to say on this very important question of our responsibilities as far as standard specifications are concerned.

Mr A.A. Middlecote, Pr.Eng., B.Sc. (Elec.Eng.) made the following additional comments to his already published paper entitled "The Responsibilities of the Power Supply Engineer as Regards Formulation of Standard Specifications"

Mr President, gentlemen, had my paperette been given on May 24th, it would have coincided with the anniversary of the birth of Jan Christian Smuts and I would then appropriately have been able to introduce my paper with comments on 'holism' which is the basic philosophy behind standardisation.

However, we can still amuse ourselves trying to fathom what Smuts really meant by 'holism'. Basically it is that everything consists of parts and that these parts act and react upon each other to produce a pattern of development, and Smuts traces this development from the earliest enzymes right up to the engineer!

To those of us who know, this is also the basic philosophy of systems engineering and that of natural management, not necessarily MBO, though;

and/...

and it's interesting to see how this holistic approach to evolution has a parallel in our own work.

In the animal world, for instance, you get such mutations as the giraffe with its long neck. This came about through a set of circumstances causing the parts to act and react to produce that peculiar animal. This reminds me of the old joke that a camel is said to be a horse that was designed by a specification committee! (laughter)

Let me say right here and now that we don't produce camels in specification committees provided we have the right parts and they act and react with each other in the correct way. Holism is important here in that it teaches us that we must have the right parts in a committee so that they act and react to produce the best specification.

In order to grow we have to work as a country and not as individual towns and villages. Take for example a town like Blikkiesdorp which has its own individual factors which act and react to bring about its progress. Just like a germ colony it grows in a perfect logistic curve until it reaches the bounds of its confines and saturates, and then we have no growth factor.

This applies equally to the bigger towns like Port Elizabeth and Cape Town but fortunately for Blikkiesdorp there is a railway system connecting it to the rest of the country and the bigger towns to which it is linked act and react and so provide another growth factor for Blikkiesdorp.

In this way we have the Cape Province looking quite promising and looking with envious eyes at the rail connection to the goldfields in the Transvaal. The Transvaal and Free State then act and react to produce a national growth factor which ultimately also benefits Blikkiesdorp.

Then, finally, you get a Common Market, which is why England is so keen to become part of a bigger whole; and the world market which brings about growth through international trade.

Quite seriously, the lesson that Blikkiesdorp has to learn is that of not being parochial in outlook but to think of the good of the whole country which will be to their ultimate benefit as well.

In practice this means that we've got to co-operate and get people to think as parts of the whole. First they must realise that they come from different geographical positions and must therefore honour each other in attempting to find the best solution. Secondly, there are two different groups of people - consumers and manufacturers - who have to work together and co-operate wherever possible. The manufacturer gets cheap energy from the supply authority who, in turn, is a consumer of his products. The manufacturer then grows, establishes even bigger industries and takes even more current from the consumer. In this way you build each other up.

You may say that all that happens under these circumstances is that the manufacturer makes a bigger profit. This should not really be the case because standardisation breeds competition and therefore lower prices. However, should the manufacturer be making big profits, this is all to the good because it creates capital for further development somewhere else in the country.

The difficulty here is that many will accept that this argument holds good for a thing such as circuit breakers or stoves, but not for transformers. Although there might always seem to be exceptions we must be big enough to see that these exceptions usually only exist in our own minds.

There was a very interesting talk given on the radio the other morning on personnel management in which it was said that it's now been established that it is not money that is the main motivation behind people working, but job satisfaction. Even more amazing is that they've recently found out that each level of management or workman believes that this holds for him but not for those below him.

Having introduced this subject with its consequent appeal to manufacturers and consumers from the different parts of the country to work together, I would like to draw your attention to the published proceedings where I have specified ways in which a supply engineer, being a specific type of consumer and representing the consolidated opinion of supply engineers throughout the country, has his own particular contribution to make. (p. 47)

The question of safety is virtually a form of insurance in that the amount

of money spent is used to prevent the loss of a life.

Following on that I've given several examples. I don't necessarily agree with everything I've said there. For instance, I'm not saying that you should do away with tapping switches but the thought has been expressed that it might be a good idea. This is the sort of thing you've got to look at and decide for yourselves.

Finally, there are two points I'd like to raise as somebody is bound to bring them up. The first is that the reason why we have to be very active in a standardisation mark scheme is not only to make money for the Bureau, nor merely as a guarantee of quality to you, but it is to give us feed-back information to ensure that the specification is in fact achieving what it was intended to achieve. If you examine the total quality control circle as published in the Proceedings you will see how important this is to the whole concept of standardisation and where it fits into the scheme of things for the good of the whole country.

Secondly, I quoted Lord Kelvin's statement on figures. These must be available for purposes of analysis and this is why we always appeal for reports on products for which there is a South African specification and, more particularly, for which there is a South African mark, so that we can control the manufacturing quality assurance. It is this feed-back that enables us to put right anything that has gone wrong as we are all human after all.

That is all I have to say, Mr President. I'm ready to be fired at!

PRESIDENT: Thank you, Mr Middlecote. You certainly are the diplomat of the Bureau of Standards! Gentlemen, the paper is now open for discussion.

I.H. Hess (Cape Town): Mr President, I'm really not surprised that Mr Middlecote started off by quoting General Smuts. He was a politician and Pat should have been one too! (laughter)

I'm in the very difficult position, sir, in that Mr Middlecote and I have known each other for many years and have seldom agreed on any topic. He spiked my guns by inviting me to lunch with him today and in fairness I had

to/...

to tell him what I was going to say now. No doubt that is why he steered clear of the published paper! (laughter)

One thing I'm not at all happy about is the Bureau mark. I can well see the object of it when it comes to production lines such as miniature circuit breakers or even stoves and fridges. There's a lot to be said for it in those cases. In England and on the Continent they have similar marks, as also possibly in America.

However, I have my reservations when it comes to having to give 2½ preference to a transformer manufacturer because he has the Bureau mark, especially when I happen to know that the Bureau mark walks in there for tea once a month. I just don't see the purpose this is serving. Mr Middlecote assures me that this is going to be universal but seeing is believing.

Personally, when it comes to major items of equipment, we (and I'm sure other supply engineers act in the same way) want to inspect this equipment in the various stages of manufacture. Mr Middlecote pointed out to me that of course when you test a transformer you don't know what's gone inside the windings. But when you go to inspect a transformer you don't just look at one transformer and leave it at that. Surely you look around the factory and see what the manufacturer is doing to other transformers in the various stages of manufacture as well. We still want to inspect that transformer so I don't really see what purpose this Bureau mark is serving.

Mr Middlecote again spiked my guns by admitting that it does bring in very useful revenue and from that point of view (it is no doubt a very good thing.

One other point, Mr President, is the statement on page 46 that: "In effect the fact that a specification has been made a standard specification by the abovementioned declaration means the specification has been accepted by the country as its national standard specification and all in the country are expected to accept this standard specification as a description of the commodity they wish to buy or sell".

I really feel this is an attempt by the Bureau to set this up as the holy

of holies and to tie our hands in that once we accept the standard, that is the be all and end all. To my view the standard is a basis from which we can work. It lays down the minimum requirements. Whatever more we require beyond that we, as the supply engineers, have to decide. Thank you.

H. Barnard (Brakpan): Mr President, we go to a lot of trouble to draw up standard specifications but there is just one thing that worries me, and here I refer mainly to smaller items.

As we all know there are committees for plug top specifications, plug outlet specifications etc., etc. Now the local supply authority engineer is always looked upon as being responsible for anything installed in his area of supply. Yet what control has either he or the SABS over the articles sold in chain stores where you can buy anything from a globe to a small welding transformer.

These are mainly portable items and are not inspected by the local supply authority inspectors. This constitutes a definite problem because in quite a few instances in Brakpan we have found such items which did not comply with the SABS standard specification. They didn't have the Bureau mark and were of a very inferior quality. Had the supplier of those articles applied to the authority for approval of those items, it would never have been given. The public, however, still buy these goods.

I would like to hear from Mr Middlecote what, if anything, can be done in this regard. Thank you.

E.E. de Villiers (Rustenburg): Mr President, first of all I'd like to say I really enjoyed reading Mr Middlecote's paper.

On and off I've been on some of these SABS committees and when I listened to Mr Middlecote just now I thought he was going to let us into some of the secrets of the way they constitute these committees. I've come to the realisation that they rope in the manufacturers or the suppliers because if they are not satisfied they will not manufacture and market their goods. On the other hand, if the consumers or we, as suppliers of electricity, are not satisfied, then we will not buy their goods or allow them to be used.

This is why they rope all of us into it as well, and I think in the long run we are likely to be the most important people. If the manufacturers don't toe the line as far as we're concerned, then the SABS will flop and Mr Middlecote will be without a job!

P.J. Botes (Roodepoort): Mnr. die President, ek geniet dit altyd om na mnr. Middlecote te luister want hy praat so lekker! (gelag)

In verband met wat mnr. Hess van Kaapstad gesê het, nl. dat 2½% voorkeur gegee word aan SABS spesifikasies, wil ek net sê dis natuurlik nie noodsaaklik vir 'n persoon of vir 'n stadsraad om 'n item aan te koop wat 'n 2½% voorkeur het en dus die goedkoopste is nie. As jy 'n saak kan maak en jou raad kan oortuig daarvan, dan kan jy administrateursgoedkeuring kry en jy kan koop wat jy wil.

Dis wat ek nou net in Roodepoort gedoen het in die geval van 'n transformator wat vir my oneindige probleme opgelewer het; dit ten spyte van die feit dat dit die SABS merk gehad het, die goedkoopste was, asook 2½% afslag gehad het. Ek noem dit net ter inligting. Dankie, mnr. die President.

E. Trautman (Ladysmith): Mr President, in regard to the question of standard specifications, there is a danger that in sticking strictly to standards we may later find ourselves in a very static and defensive position which may hamper further development. I would rather that the standard specifications were vague so as to allow for further advancement. Thank you.

PRESIDENT: That's a new one for you, Mr Middlecote! (laughter)

C. Lombard (Germiston): Mr President, may I also say how much I enjoyed listening to Mr Middlecote. I think we always look forward to his talks and papers.

I cannot agree with the views expressed by Mr Hess, particularly in regard to inspections carried out at the factory. Here I'd like to say that we appreciate the service rendered by the Bureau; in particular the special inspections carried out on our behalf.

Our experience in the past has been that the Bureau would like to know when we place fairly large orders so that they can give attention to these orders and in this way render a very valuable service to us.

I'd like to take issue with Mr Middlecote on one point, though, and that is that we certainly do expect SABS committees to produce specifications for 'camels': After all, it's perfectly designed for its particular purpose which is exactly what we expect from these SABS committees! Thank you. (applause)

K.J. Murphy (Cradock): Mr President, on page 47 paragraph 2.3.2. Mr Middlecote lays down the golden rule for the writing of specifications viz. that the language should be unambiguous and that preference should be given to performance rather than details concerning the materials to be used and so forth. This I think is of particular importance and should be noted.

I'm thinking here in terms of our own small town where they make use of this very principle for some rather devious purposes. For example, when they built a big rugby stadium they called for tenders and the tenderer had to supply his own drawings, plans and specifications. The result was they got an excellent plan involving no architect's fees.

This same principle was applied when they wanted a new Bantu hall. This too resulted in a very nice hall at a most reasonable cost and again no architect's fees! Thank you.

P.J. Botes (Rocdepoort): Mnr. die President, ek wil net graag 'n regstelling maak as iemand my dalk nou miskien verkeerd verstaan het. My Raadslid dink ek wil niks te doen hê met die SABS nie en dis glad nie die feit nie! (gelag) Wat ek eintlik wil tuisbring is dit: dat indien jy nie tevrede is nie weens jou eie toestande of sekere probleme wat ontstaan het, kan jy altyd 'n positiewe saak uitmaak om te kry wat jy wil hê. Die SABS is egter nog daar om jou die leiding te gee en die positiewe rigting aan te dui. Ek hoop ek maak nou myself duidelik. Dankie, mnr. die President.

PRESIDENT/...

PRESIDENT: Ek hoop so, mnr. Botes, want u is ons verteenwoordiger op die komitee. (baie gelag)

L. Fitcher (Kempton Park): Mr President, I'm not going to refer to anything in Mr Middlecote's paper but, sitting listening to his speech, I was reminded of my O. & M. man at work always preaching motivation!

How far do we intend going in respect of standard specifications? Aren't we in this way detracting from individuality? Mr Lombard referred to the beautiful specification for the camel. There I agree with him to a certain extent but I don't think that specification went far enough. After all, the camel is still limited to an 8-day trip across the desert and it would require the services of an engineer to extend such a trip by two days!

Mr President, I've always been a protagonist of standardisation but I must admit I had some slight misgivings today at lunch at the thought of this being applied to the lovely women I saw there as well! On further consideration, though, I came to the comforting conclusion that by the time such specifications were promulgated, I should be too old to care anyway! (hearty laughter)

A.H.L. Fortman (Boksburg): Mr President, all I want to say is, thank goodness for the SABS! We all know that 'a problem shared is a problem halved'. Why then should we take onto our own shoulders the problem of deciding whether or not a company is producing a good article. It is important to remember that we have the SABS to help us, and that is why I always back a standard for a particular article. Thank you. (applause)

PRESIDENT: Thank you, Mr Fortman. If there is no further discussion, gentlemen, I will now call on Mr Middlecote to reply to your comments and questions.

A.A. Middlecote (SABS, Pretoria): Well, Mr Fortman has already partly answered Mr Hess in that it greatly helps to share a problem. This also involves the sharing of staff and means you don't need so many specialists. Much as Mr Hess might like to have a number of inspectors carrying out

comparisons between the factories at Boksburg and Benoni with those in Port Elizabeth and Cape Town, the expense is excessive and it is much cheaper to have these people inspecting in one place on the behalf of various authorities.

What is more important I think, is to keep in mind this holistic attitude. Our duty is not to view the industrialist with suspicion, but to help him become such a strong industry that he can compete on the world market. However, don't let's take Britain as an example of standardisation as they themselves admit they are a very bad example. This is why they have lost a lot of export over the last 10 years to the Japanese who appreciate standardisation and rigorously apply the philosophies which we find so attractive.

The important thing is to encourage your industries to basically build-in quality into the product and not attempt to 'inspect' it into the product. This is the whole philosophy of the standardisation mark scheme, and not as I said earlier jocularly, to make money or even to give you a direct guarantee of quality. Admittedly that is of consequence, but what is most significant of all is that you're training the manufacturer up in good quality assurance principles.

We have, in fact, a specialist whom we're sending out into industry not for the standardisation mark scheme, but just to help any industry appreciate what a modern concept of quality assurance with its correct proportion of statistics etc., would mean to the growth of a healthy industry, and to your peak demands, including those of Mr Hess.

There are great benefits to this. Already we've found the suppliers of wire for transformers asking for a standard and a mark so that they can also tailor this into their guarantee, as this is a very vulnerable part of any transformer.

We can go on like this ad infinitum. If the mark scheme is sincerely applied it is an excellent thing. Mind you, it does require a lot of moral courage and my face has been very red on several occasions! Despite all this, I do believe/...

believe that what is good will come out and that in the end it will be strong.

Further proof of this is that SENEL, the Common Market standardisation authority is going flat out to establish a Common Market mark scheme. This upset the Japanese and Americans to such an extent that we in the IEC in Athens are again hurriedly discussing an international mark scheme so that everyone can share in this underwriting and this better approach to quality assurance in a product. They are by no means fools and are beginning to realise that what we did in the past is worth doing in the future.

The point made by Mr Barnard is a difficult one. We must, of course, try to keep up to date with our specifications. Some of them may be weak but this can be put right when it comes to the installation. For instance the Wiring Regulations say that all equipment must comply with the specification and the foreword states that the specification is that of the South African Bureau of Standards where a safety specification applies. Unfortunately this doesn't mean that you can demand mark quality at the moment, but Mr Grant will be examining this aspect and we'll try and get these points cleared up so as to ensure that our specifications provide what you require, particularly with regard to safety and the difference in quality between the mark and the non-mark type imported product.

Mr de Villiers, we do try and bring about peace between the manufacturer and the consumer. To summarise: we try and bring order where there is chaos and this is no mean task I can assure you.

I've already admitted, Mr Botes, that my face is red on occasions but we do tighten up wherever we can. For instance when we find that something is going haywire with any manufacturer's quality assurance we try and discover the cause of this or remove his mark altogether, so as to prevent any bad comebacks.

We have our performance specifications, Mr Trautman, but we wouldn't like to refer to them as being 'vague'. This is in keeping with the non-scientific standard by which you judge a product not by its own well-qualified performance standards but by your own arbitrary standards.

Most of the others, I think, have just been kind to me, but I must just assure Mr Fitcher that there is already standardisation among the female sex. After all, you don't find women with three arms or legs, do you now! (laughter)

Well, gentlemen, I think that about exhausts the questions. I must thank you for listening to me. (hearty applause)

PRESIDENT: Thank you, Mr Middlecote. Gentlemen, I think you all agree that this has been one of the most entertaining papers we have listened to in a long time. (applause)

I will now call upon Mr Murphy of Cradock to take the chair for the Cape Eastern Branch Session.

K.J. Murphy (Quizmaster): Mr President, before starting the discussion on the Cape Eastern Branch Session, allow me to congratulate you and your Executive on the most excellent way in which you have passed the buck in the presentation of questions to the meeting here today. It has succeeded very well so far and I trust will continue to do so.

QUESTION (a): Transformer Arc Welders

Transformer type single phase arc welders for plugging into 15 amp domestic socket outlets are marketed throughout the Republic, in spite of the disturbances they create on low voltage systems.

Should not the sale of this type of welder be prohibited or limited to rural or bulk consumers with their own stepdown transformers?

We note that some of these arc welders have actually come out with a mark of approval from Escom but we have found them no better than others; the worst of all being the home-made ones.

U weet op Cradock gebruik van hierdie entoesiaste hierdie goed snags wanner ander mense se kinders wil leer ens. Het dit nie tyd geword dat

'n mens die goed moet verbied nie? of wat kan daaromtrent gedoen word?
 Wat is die ondervinding van die ander lede?

H.C. Dreyer (Paarl): Mnr. die Vraesteller, ek dink nie dit sou korrek wees as ons as ingenieurs sou besluit om sekere apparate as sulks te belet nie. Ek dink dit berus by die demokratiese regte van die verbruiker.

In die regulasies vir die Kaaplandse ondernemings word daar bepaal dat indien die gebruik van enige elektriese apparaat onnodige steuring veroorsaak aan ander verbruikers, het die ingenieur die reg om die gebruik van daardie apparaat te belet. Ek dink daardie regulasie was oorspronklik opgestel vir spesifieke toepassing op die gebruik van sweisers.

In the case of consumers in outlying districts where they have their own transformers, however, the use of such a welder would not constitute a disturbance to anybody. Thank you, Mr Quizmaster.

QUIZMASTER: Thank you, Mr Dreyer. These consumers have been specifically excluded from the question.

E. Trautman (Ladysmith): Mr Quizmaster, my predecessor, Mr Stevens, made a ruling on this which is incorporated into the by-laws: that the use of domestic arc welders is only permitted during day hours. This completely eliminates nuisance factors such as flickering lights at night.

M.J.W. Chappel (Port Elizabeth): Mr Quizmaster, I think the problem here is one that can be solved with regulations. Any consumer causing a disturbance to the supply to other consumers is committing a breach of regulations.

From time to time in Port Elizabeth we do have complaints about lights flickering. Normally we send an inspector round and he can generally locate the offender quite easily by the glow in the sky. He is warned that he may only use the welder during the day and this usually solves the problem. Thank you.

J.L. McNeil/...

J.L. McNeil (Kokstad): Mr Quizmaster, provided there is no manufacturing difficulty involved, could this problem not be solved by incorporating a series condenser which would stand up to these arduous conditions, in this type of welder?

QUIZMASTER: Thank you, Mr McNeil. We'll have to give that some thought.

P.J. Botes (Roodepoort): Mnr. die Vraesteller, soos reeds gemeld deur mnr. Dreyer en mnr. Chappel, doen ons ook feitlik dieselfde in Roodepoort. Ons waarsku eers vir diegene wat enige versteuring veroorsaak en as hy nie daarna luister nie, dan sny ons sy krag af. Sommer verlede week het dit met my ook gebeur! (gelag)

VRAESTELLER: Dankie, mnr. Botes. Enige ander sprekers?

A.F. Turnbull (Vereeniging): I would like to approach the question of home welders from a different point of view. We were unfortunate enough to have two fatalities on home welders quite recently, so there is more than one aspect involved here.

This does indicate the importance of sensitive earth leakage protection. Here again there is the further problem that a lot of people using these home-made welders are under the mistaken impression that it is the sensitive earth leakage device that is at fault and not the actual welder as such, and they then bridge out the sensitive earth leakage device.

I feel, also, that it deserves support from the individually protected plug socket outlet with the circuit breaker. At least then this would prevent the use of these badly designed welders which are downright dangerous.

Again this is a question of standardisation and control of the use of welders. I feel that any welder that is sold should be made strictly to a safe specification.

A.A. Middlecote (SABS, Pretoria): In view of what Mr Turnbull has just

said I think I had better report for your information. There has been a request to the Bureau to draw up a safety specification for welders and there is a possibility that the Minister may be asked to declare such a specification compulsory.

We are aware that there is a lot of rubbish on the market at the moment and that these are, in fact, dangerous. However, when the committee does look into it, perhaps some of these other factors you're worrying about will also be cleared up. Thank you.

H. Barnard (Brakpan): Mr Quizmaster, I think Mr Middlecote might have some competition there since I also have a home-made welder! (laughter)

I must admit we have the same problem as the other municipalities and we solve it in the same way by restricting people to welding during the day only.

But what I want to know is, how many of these very municipalities, when they receive a complaint about a welding set interfering with the lights, go back to their councils and ask for R100 000,00 to improve their reticulation networks? By having a better supply to these different consumers you might then be able to get away with night welding.

D.L. Condra (Usco Cable Co. (Pty) Ltd., Vereeniging): I'm speaking in my capacity as an unqualified American, Mr President, but since we're talking about reticulation systems, I thought I might raise the point that in the United States the reticulation conductors are normally sized mainly because of television sets. Things such as arc welders, air conditioners and any large motor starting up will play havoc with a television set and I think this Association will want to begin considering these factors in future designs, bearing in mind the fact that the consumer will put up with his lights flickering once in a while. However, when he's watching his favourite TV programme he insists on not being interrupted by any variations in the screen.

QUIZMASTER: Thank you very much, Mr Condra. You've introduced something new to this discussion, television being very topical at the moment.

J.L. McNeil (Kokstad): Mr Quizmaster, in view of what Mr Middlecote said, I would suggest consideration also be given to specifying a DC type, incorporating a bridge-connected rectifier and a condenser on the output side.

J.A. Loubser (Benoni): Mnr. die Vraesteller, soos die toeval dit wil hê, het ek iets met hierdie SABS-komitee oor televisie-stelle te doen. Ek sal ook nou vir u sê dat die spesifikasie gaan lees blykbaar dat daar nie meer 'n seker hoeveelheid wisseling in spanning mag wees nie. Dit is dus duidelik dat sweistoestelle van hierdie aard gaan 'n groter wisseling in spanning veroorsaak as wat gaan toegelaat word. So ek dink net dis ons almal se probleem op die ou end.

VRAESTELLER: Dankie, mnr. Loubser. Gentlemen, it seems that for the present the general consensus is that provided you weld during the daytime you may continue to do so, but with the advent of television we'll have to give serious thought to this matter.

I can assure Mr Barnard that it makes very little difference how close you are to the substation, or to the size of your mains. In certain circumstances they still, in fact, cause quite a lot of flickering. All in all, I think we've given Mr Middlecote some food for thought on this question of welders, particularly with the advent of television. Thank you.

Question (b): APPRENTICE TRADE TESTING

How many Undertakings have been advised by the Department of Labour that as a result of their poor apprentice trade test pass record they are no longer allowed to indenture apprentices under the Metal Industries Act?

As you know, gentlemen, this is an old, thorny problem and has been put forward by one of our bigger municipalities. Ek gaan dus mnr. Chappel vra om dit in te lei want hy het besondere kennis daarvan.

Eintlik is dit 'n vraag wat ons almal raak want ons sit seker almal met die probleem opgesaal van vakleerlinge wat nie hulle ambagtoetse kan deurmaak

nie/...

nie. Mr Chappel.

M.J.W. Chappel (Port Elizabeth): Like all other municipalities Port Elizabeth has for many years taken on apprentices. In the past it was a five-year course, during which period the attempt was made to give them a general grounding in all the work done by a local authority. They had experience in overhead work, underground work and in the power station workshops.

We were not very happy when, after the Compulsory Trade Test was introduced, it was apparent that our boys had a very high failure rate. We gave the matter some thought but felt that possibly the basic intention of the Trade Test was to separate the very good apprentices from the ordinary ones, and that the ultimate goal in training a man as an apprentice was to have an artisan working as an artisan.

However, in 1968, after some considerable amount of correspondence, the authorities came to the conclusion that this high failure rate was an indication that we were not training our apprentices adequately, and the Port Elizabeth Electricity Department apprentices were no longer permitted to be apprenticed under the Metal Industries Act.

We were informed at the time that Escom apparently have their own Apprenticeship System Committee and we investigated whether we couldn't perhaps apprentice our boys under this scheme but it appears this is not possible.

The solution we finally came to, at the suggestion of the Department of Labour, was that our apprentices be apprenticed under the Common Law and not under the Metal Industries Committee.

We've been doing this for several years now and the boys have now reached the stage where they would normally have done their Compulsory Trade Test, but apparently this doesn't apply to these Common Law apprentices.

We would, however, like them to at least have the option of sitting an examination although we do feel the Metal Industries Committee syllabus doesn't cover the same ground as that covered by an apprentice in a local authority where they get experience in all the phases of work

involved in an undertaking. They get a fairly thorough knowledge of the job but not a specialised one. For instance they spend three months at a time doing house wiring and installation work, whereas the examination seems to stress motorwork and house wiring. The boys are apparently asked to do the Rand Mines joint whereas we do the more conventional white joint. Of course a certain amount of responsibility does lie with the boys themselves. Writing an examination involves technique as well as knowledge. There are many people who can go into an exam room knowing the subject fairly thoroughly and yet make a hopeless mess of it. I'm afraid these boys just don't have the technique for an exam.

Another factor involved is that, like most apprentices, they are not very motivated youths. They do their work and make satisfactory employees, but they're not exactly human dynamos!

My question is then whether Port Elizabeth is the only town which has been debarred from apprenticing their boys under the Metal Industries Committee, and whether delegates feel there would be any advantage in the AMEU applying to form its own apprenticeship committee either under the Municipal Electricity Supply Industry or the Local Authorities Electricity Supply Industry? Thank you.

QUIZMASTER: Thank you, Mr Chappel.

PRESIDENT: Gentlemen, I would suggest that we take the question posed together with the first two questions of the Good Hope Branch as they all concern the same matter. After tea we will give Mr Hare and Mr Wannenburg a chance to clear the air and advise us exactly as to how we stand on this matter.

ADJOURNED FOR TEA

CLOSING SESSION (Friday, 26th May, 1972)

PRESIDENT: Gentlemen, before we proceed with the actual Forum, Mr Anderson of the CSIR would just like to clarify something concerning the earthing of roofs.

R.B. Anderson (National Institute for Electrical Research, Pretoria): Thank you, Mr President. It seems that I didn't make myself very clear yesterday and that some misunderstanding has occurred, so perhaps it would be best if I stated the case more clearly.

In connection with metal roofs unearthed, the danger is not so much from a flash of lightning occurring to the roof itself - this may happen on rare occasions - but, in the electric field of a thunderstorm the roof could easily be charged to a very high potential and, being quite a large expanse, could carry quite a considerable charge. Under these circumstances, anybody touching it could be killed. Also, it could flash to the nearest earth point, perhaps through some inflammable material, and start a fire.

I rather got the impression that people were thinking one might be able to get away with not earthing metal roofs but this, I think, would be extremely dangerous. There are some difficult cases where metallic foil is being used with plastic material backing which may not be easy to earth, and this will also have to be taken into consideration.

Thank you, Mr President.

PRESIDENT: Thank you, Mr Anderson. I think we'll now proceed with the very interesting question on the Forum, and I'll hand over to Mr Murphy again.

QUIZMASTER (K.J. Murphy): Thank you, Mr President. Gentlemen, I want to draw your attention to the second part of the question introduced by Mr Chappel viz. do delegates feel that there would be any advantage in the AMEU applying to form its own apprenticeship committee for the Electricity Supply Industry? Then, too, I should like to call on the Chairman of the

Cape of Good Hope Branch to introduce the first two questions on his agenda. We will combine these two with the two we are dealing with at present.

H.C. Dreyer (Paarl): Dankie, mnr. die Vraesteller. Eintlik is ek nie die Voorsitter van die Goeie Hoop nie. Mnr. Brimmer kon ongelukkig nie hierdie vergadering bywoon nie en hy het toe vir my gevra om namens hom op te tree, asook om sy verskoning aan u oor te dra.

GOOD HOPE BRANCH SESSION

Question 1: Why should apprentice electricians be required to travel to Olifantsfontein for trade test examinations while we have in the Cape an excellent training centre at Westlake? Why the extra expense to travel all that distance? (Wellington)

Mr Quizmaster, this might be considered a somewhat rhetorical question but it is one which revolves around cost. We have discovered that the main reason why the tests are not carried out in the Cape Province at Westlake is because no facilities for such trade tests exist there. The answer to the question as to why they don't establish such facilities there involves a weighing up of the cost of apprentices having to travel up-country to Pretoria as against the cost of establishing these facilities at Westlake.

This question can only be answered by somebody who knows the numbers of apprentices who do travel up for these examinations and the Good Hope Branch would be very pleased if Mr Hare could enlighten us on the subject.

Question 2: In practice it is noticed that the wireman's licence is of more value than the electrician's certificate. Factories ask for an electrician with wireman's licence and most times they get a wireman who becomes a maintenance electrician. Where is the difference? No wonder that every boy goes for the wireman's licence first. It is high time this puzzle is solved. (Wellington)

Again this question was partly handled by Mr Wannenburg yesterday when he stated that only those who have completed their formal apprenticeship will in future be accepted as candidates for the wireman's licence. That particular difficulty will therefore no longer arise.

However, there is a further issue arising from this on which we would welcome some clarification from Mr Wannenburg, and that is the apparent clash which seems to exist between the two legislations - the Factories Act on the one hand and the Wireman's Act on the other. In the case of the former when an apprentice has completed his apprenticeship (his 5 years) he is considered a competent person and is permitted to do any electrical work whether or not he has passed any examinations. However, any youngster who has been indentured as a wireman's apprentice and who fails to pass any of his examinations is not allowed to do any wiring work on his own on the completion of his apprenticeship and, in terms of the Wireman's Act is not considered a competent person. Thank you.

L.H. Hare (C.O.T.T.): Mr Quizmaster, I will attempt to answer some of these questions but not in the order in which they were asked.

Firstly, Mr Dreyer has asked why the facilities at Westlake cannot be made available for trade testing electrician apprentices in the Western Cape. Although this might appear to be a case of simply utilising existing facilities, this is not the case as the whole issue has to be considered at Departmental level. We have to take a Republic-wide view of the whole thing because what we do for one trade or industry must be applicable to all trades and all industries.

Furthermore, the training facilities at Westlake are not necessarily suitable for trade testing. It is quite easy to train people using a limited number of instruments or equipment, but when trade testing is carried out the piece of equipment or particular instrument required by the candidate must be immediately available. Also, there should be a replacement on hand in case of breakages. The point I'm making here is that training facilities are not necessarily adequate for trade testing.

Industry/...

Industry has been asking for the past few years for decentralisation of trade testing and this matter is under constant consideration. In fact Mr Hyde, the head of the organisation to which I belong; Mr de Villiers, the Registrar of Apprenticeships; and Chief Inspector Schmidt from the Department of National Education are, I believe, going down to Cape Town in a matter of weeks to discuss this matter again. It all revolves around the fact that what is done for one must be done for all.

At this stage I'd like to deviate slightly: we conduct tests for the Electrical Wireman's Registration Board and are the appointed examiners in terms of the Electrical Wireman's and Contractor's Act. We conduct these examinations on behalf of the Board and the Board may stipulate how we are to do this and in what centres. This is in accordance with the implementation of that particular Act of Parliament.

I now want to give you some figures that concern apprentices only, i.e. apprentices in terms of the Apprenticeship Act of 1944. Of the 1 030 apprentices tested in the electrical workshop at COTT last year, 34 came from the Western Cape, averaging from 0 to 5 per month.

Natal has also been asking for decentralisation. The total number of apprentices tested at Olifantsfontein last year in the Metal Industry alone was 3 500, of whom 600 came from Natal and the rest from the Cape Province combined.

The total number of tests in all trades and all industries at COTT last year was 10 300+, and the total number of tests arranged, 16 000.

However, the decision as to whether tests should be conducted in the Western Cape or anywhere else is not that of COTT, but is a Departmental one and is under constant review as I've already mentioned. What I can say, though, is that Westlake is not a suitable venue as it would take a tremendous amount of money to equip it as a trade test centre.

Mr Quizmaster, the last speaker mentioned something about candidates for the Wireman's Licence having to have served a formal apprenticeship. It is really Mr Wannenburg's function to answer this but I will say that I think this is incorrect as the Electrical Wireman's Registration Board

determines the conditions under which a candidate is acceptable for that examination and he is not required to complete a formal apprenticeship for this.

I will definitely leave it to Mr Wannenburg to clarify the apparent clash between the two Acts.

As regards the AMEU Apprenticeship Committee: I had the privilege some years ago of attending meetings of a subcommittee of the AMEU which considered whether it would not be possible to introduce the trade of

municipal electrician. After quite considerable discussion which involved enumerating the type of things he would not be required to do such as conduit work, motor control work, wiring of electric motors, panel wiring, it was decided that in view of the diversity of application, it would be impossible for a small town municipality to train a man to the same degree and on the same variety of equipment as is done in Johannesburg for instance. It will be on record that this subcommittee of the AMEU decided that this was not a feasible proposition. However, the matter has probably been reopened and may well be reversed.

The schedule of training at the Trade Testing Centre is not drawn up by our Organisation, but by the relevant apprenticeship committee for the industry concerned. This sometimes leads to a rather chaotic condition where you have, for instance, an electrician in the sugar industry being required to work on telephones; and in the mining industry on hoist control or hoist rigging systems, and in the metal industry, on neither. However, I'm told that members of the AMEU have undertaken to train their apprentices in accordance with the metal industry schedule of training.

Once an apprenticeship contract has been signed it is a legal, binding agreement between the employer and the employee. The employer undertakes to train in terms of the gazetted schedule of training and the Gazette is quite clear on this point. It says: "The employer shall train..." and then lays down the conditions under which he shall train.

As already mentioned we test a great number of people in a great variety of trades at COTT. We are professional examiners. Statistically the

results of our examinations must follow normal distribution curves and we take the greatest possible care and trouble to ensure that no candidate who comes up is at a disadvantage in any way whatsoever from a testing point of view, due to lack of equipment, tools or materials.

As far as I know Port Elizabeth municipality is the only municipality which is not allowed to indenture apprentices in terms of the Act. The reason for this was that the record of trade tests results there was not merely one of failure but, generally speaking, of very bad failure. Mr Quizmaster, yesterday I distributed the results of a survey that we took out on a rather limited group of candidates. This will serve to give you some idea of the care that we take to try and establish whether statements are valid or not. It was said, as a matter of fact by the chairman of a subcommittee investigating trade test failures, that the reason that electricians failed the test was because they couldn't do conduit work. It was as simple as that. This particular subcommittee was investigating failures of marks of below 30%. We immediately tried to establish whether or not this statement was true and this brought to light some rather startling figures.

Although I wasn't involved in the final negotiations involving the Port Elizabeth municipality I possibly started the ball rolling by submitting a report on the very, very poor trade test results. This resulted in an inquiry by the Divisional Inspector of Labour in Port Elizabeth, but I believe the present unfortunate situation is partly the result of the reaction of the Port Elizabeth municipality to this investigation into the possible causes of this high failure rate. I was told in no uncertain terms that the business of the municipality was to generate and distribute electricity and not to train apprentices. Apparently this was also said to the local Apprenticeship Committee and eventually got back to the Registrar, and, I feel, precipitated the action taken.

Incidentally, action has also been taken against firms in industry generally, not only against a municipal body. I know of several firms who have been refused any further apprentices because of their shockingly poor showing

at the trade test.

I'm going to quote some figures to give you some information. Incidentally, we keep these statistics and they are freely available to anybody who wants them at any time. Last year we tested 3 500 electricians in the Metal Industry and the average percentage of those who passed was 27%. The previous year it was 25%.

The overall figure for COTT for the candidates who passed examinations in all trades was 38.5%.

The Metal Industry gives a pretty poor showing, though not as bad as some. The Electrical Wiremen, however, have come up rather dramatically from a 21% passing average the previous year to 26%.

In the Metal Industry we include obviously all municipal electricians.

Of course we are very well aware of the problems associated with training an apprentice. As a trade testing organisation we are naturally interested in methods of training and whenever we are able to offer advice we do so. One of our methods of getting information of this nature is to visit schools, centres and organisations which have organised apprentice training. In my opinion, even if the AMEU does establish its own apprentice committee with its own schedule of training, it will still be mandatory for all members of the AMEU to train to that schedule of training.

Incidentally, the reason why the ESCOM schedule of training is not suitable is that they train to a very much higher standard than any municipality (except the very large ones) could hope to do. In fact, the first candidate to hit 89% as an average in the test was an ESCOM candidate. Their practical training schedule specifies to a far greater degree of detail than does the Metal Industry, and if an organisation is unable to train to the standards required by the Metal Industry, Mr Quizmaster, they haven't a hope of trying to use ESCOM's standards.

The unfortunate position in which Port Elizabeth finds itself at the moment is that in terms of the Common Law apprenticeship agreement that has been

entered into, their apprentices are only eligible for a trade test after they have satisfied the Registrar of Apprenticeships that they have completed five years practical training. Only then may they be tested in terms of the Training of Artisans Act. This means that these boys are definitely at a disadvantage.

We carry out a lot of investigations into this matter and discuss it with a large number of people and we have come to the conclusion that the boy himself cannot be held responsible for failing the trade test. The employer has the authority, not the apprentice; and if an apprentice is not fulfilling his part of the contract action can be taken against him. It is the employer's function to see that if an apprentice is unsuitable for a particular type of work, that the Apprenticeship Committee is informed of this immediately. Apprenticeship committees are only too willing to assist in placing boys in fields where they would be better suited.

Another important point to remember is that training is expensive and that if you are going to undertake it it's going to cost you a great deal of money.

Mr Quizmaster, I would suggest that I leave it at this. I will be happy to answer further queries later after any discussion which may ensue.

QUIZMASTER: Thank you, Mr Hare. Mr Wannenburg, would you care to reply to that part of the question which falls under your department?

J.G. Wannenburg (Department of Labour, Pretoria): Mr Quizmaster, the more I listen the more I am convinced that the Wireman's Regulations Act is the most neglected Act in the country. You don't seem to realise that the major portion of that Act must be administered by you but if you have little or no knowledge of it, how can you administer it. I'm beginning to regret having asked how many of you actually possess a copy of this Act because it seems that even those who do have it, do not appear to have studied it thoroughly.

Be that as it may, Section 20 of this Act is divided into 2 subsections:

the first part tells you who may do wiring work and subsection (a) tells you that a registered wireman, or an improver, or an apprentice, or a person under the Artisan's Training Act or the Native Building Worker's Act may do wiring work.

Subsection (b) clearly states that the person who is doing an improver's job (i.e. (b) of the first section) may do wiring work under general supervision. Those who are still undergoing training must, however, be under direct, constant supervision. Am I right, Mr Pretorius ?

E.de C. Pretorius (quipped): At all times, yes! (laughter)

J.G. Wannenburg (continued): Only the other day we had a case of a youngster of 19 who, during his apprenticeship, had passed his practical test as well as Part A (theory) and thereby qualified for full registration. We would, however, prefer those who have only passed Part A and the Regulations to make use of the concession enabling them to work for a year as an improver not under direct and constant supervision. They may work by themselves but must be under the supervision of somebody on the employer side.

Even I myself, when I had completed my studies at the University, had to work for a further three years before I was permitted to write the examination to get a Certificate of Competency; and this amounts to the same thing. Give the youngster a chance, a full year, to gain extra skill and knowledge, at the end of which he may apply to sit for the examination. If he has anything to his credit we issue him with a Provisional Registration Certificate which he can renew three times in succession for six months each. This gives him a further two years in which to fully qualify and get his full registration.

That I think answers Mr Dreyer's question and I don't think anybody can say that that is not fair. Thank you.

QUIZMASTER: Thank you, Mr Wannenburg. Gentlemen, this subject is now open for discussion. Any questions ?

H.C. Dreyer (Paarl): Mnr. die Vraesteller, ek is nou op die vloer om deel te neem in die debat, nie om die vraag in te lei nie.

Eerstens, wil ek net graag vir mnr. Wannenburg sê ek het 'n afskrif van die Bedradingswet en ek lees dit gereeld. Maar ongelukkig ken ek nie die wette en regulasies so goed soos mnr. Wannenburg nie, anders sou ek vir hom kon gewys het hy is verkeerd.

Die punt is, mnr. die Vraesteller, dat my vraag nie beantwoord is nie in dié sin: mnr. Wannenburg het gesê dat 'n vebeterleerling kan drie keer aansoek doen vir 'n tydelike registrasie, maar my vraag was : wat word van daardie man nadat hy drie of ses maal eksamen geskryf en herhaaldelik druip. In die Fabriekswet, egter, is so 'n man as 'n bevoegde persoon beskou.

Terwyl ek op die been is, mnr. die Vraesteller, wil ek graag 'n aanmerking maak wat eintlik tot aanvulling is op wat mnr. Hare vir ons vanmiddag hier genoem het. Dié fasiliteite om vakleerlinge op te lei bestaan nie net uit 'n organisasie by 'n plaaslike owerheid deurdat jy jou leerplaan het, of voorbeelde het van verskillende elektriese apparaat waarop hulle opgelei kan word nie. Maar dit bestaan uit die menslike materiaal om daardie vakleerling, diegene met wie hy moet saamwerk.

Nadat een van mnr. Hare se inspekteurs onlangs in my departement was, het ons die betrokke ambagsmanne onder wie die vakleerlinge gewerk het, op die tapyt gebring om te probeer uitvind hoekom daar so min belangstelling by die vakleerlinge is. Ons het gevind dat hierdie vakmanne wat self in hulle vroeër dae opleiding deurgegaan het en self vakleerlinge was, stel in die vakleerling belang alleenlik in een opsig en dit is as 'n goedkoop bron van arbeid. Hulle beskou nie daardie vakleerlinge as mense wat moet geleer word en wat moet opgelei word nie.

Enige organisasie in ons land wat vakleerlinge oplei moet dit aanvaar as 'n feit dat hulle is 'n las, nie 'n bate nie, maar dis 'n las wat jy dra ter wille van jou land. As almal gaan weier om vakleerlinge op te lei, of om hulle huis in orde te kry om vakleerlinge op te lei, dan gaan ons land daaronder ly. Ek het selfs die indruk verder gekry dat baie van hierdie vakmanne nie

beroid/...

bereid is om vakleerlinge op te lei nie omdat hulle sinteties die tekort van vakmanne wil handhaaf, want dit pas hulle.

Ek het toe baie streng met hierdie mense opgetree en ek kan u verseker dat daar somer 'n skerp verbetering ingetree het in my departement. Ek hoop nie dit sal ooit weer nodig wees vir 'n inspekteur van daardie liggaam om my departement te moet besoek nie.

Daar is een ander aspek wat ek graag wil noem en dit is die leerplan wat voorgeskryf word vir vakleerlinge. Die opwekking en/of distribusie van elektrisiteit is 'n gespesialiseerde nywerheid wat verskil van die fabriek wat elektriese motors vervaardig; en die ope vraag bestaan nou is daardie leerplan werklik van toepassing in die geval van opleiding van vakleerlinge vir elektriese distribusie? Dankie, mnr. die Vraesteller.

VRAESTELLER: Dankie, mnr. Dreyer. Ek sal mnr. Wannenburg vra om op jou vraag te antwoord en daarna sal ons die bespreking moet kortknip want daar is nog heelwat vrae om te beantwoord. Dankie.

J.G. Wannenburg (Dept. van Arbeid, Pretoria): Mnr. die Vraesteller, ek wil net weer herhaal dat enige persoon wat vier jaar of vyf jaar lank as 'n vakleerling opgelei was en daarna nog die geleentheid gegee is om vir 'n jaar te werk sonder dat hy hoef eksamen te skrywe solank hy net onder toesig werk, en daarna nog twee jaar gegun word om sy eksamen af te lê en na hierdie agt jaar nog nie kan deurkom nie, dan het hy of geen opleiding gehad nie, of hy is geheel en al onnosel!

Ek dink u sal met my saamstem, mnr. die President, dat ons nie veel gevalle van hierdie aard op die Raad het nie. In die groot meerderheid van gevalle kry die persoon gedurende sy vakleerlingskap reeds sy teorie en regulasies afgeskryf en hy moet dan net die praktiese eksamen aflê.

Dit blyk nie of daar veel put steek in wat mnr. Dreyer nou te sê gehad het nie want ek glo nie ons kry vreeslik baie moeilikheid met daardie soort persoon nie.

Nog/...

Nog 'n punt om te onthou is dat die Wet op Elektrotegniese Draadwerkers is die enigste wet wat vereis dat 'n vakman 'n registrasie-sertifikaat van een of ander vorm moet hê. Die rede hiervoor is dat die opset van daardie wet toe dit in die lewe geroep is, was doodeenvoudig omdat al die werk wat gedoen word en wat daardie wet voor voorsiening maak, het te doen met die leke publiek en as dit nie ordentlik gedoen word en onder goeie regerings- of departementele toesig nie, dan kan ons baie mense afskrywe wat ongelukke gaan hê. Dankie.

B. Gilbert (Electrical Contractors' Association, Johannesburg): Mr Quizmaster, as probably the only employer here who employs people in the other sphere of industry, the Building Industry, and who is forced to employ licensed wiremen, I would like to point out an existing anomalous situation and that is that the people employed in the Metal Industry have exactly the same training schedule as those employed as wiremen under the Wireman's and Contractor's Act. Since Mr Chappel cannot employ his artisans or apprentices in the Metal Industry, I would recommend that he consider employing them in the Building Industry as wiremen. The only disadvantage to that, mind you, would be that he'd have to pay them in terms of the new schedule of rates as published in the Government Gazette on 10th March, 1972. According to this a matriculated youth has to get 79% of a journeyman's rate of pay! Thank you.

H. Barnard (Brakpan): Mr Quizmaster, I'm afraid I'm going to drop a bit of a bomb here this afternoon in connection with the trade testing of apprentices. Mr Hare was quite in order in quoting certain statistics regarding the pass marks of apprentices. It is, however, easy to prove practically anything today using statistics, depending merely on how you choose to interpret these.

We have discovered that where you have a large number of apprentices being trained in an apprentice school by a specialised tutor, that the apprentices who have passed their trade test have only about 20% of the knowledge of those who haven't yet passed the test and are doing their fifth year. The reason for this seems to be that all the apprentices of

a particular training school do not write the examination on the same day. Since this examination set for the apprentices is exactly the same for all this is not a very fair situation and is one which deserves looking into. Also, different apprentices have a varied approach to an examination.

Mr Hare said something which really surprised me this afternoon and with which I cannot agree viz. that the employer has the authority and that it is his prerogative to tell the apprentices what to do. This has not been our experience. Sixteen months ago we had some apprentices who were very difficult to control and we decided to suspend one of them and, as part of the penalty against him, to bring this suspension to the attention of the Apprentice Board. In the end it was we who were in the hot seat and not the apprentice concerned. Thank you.

QUIZMASTER: Thank you, Mr Barnard. Gentlemen, I think we should draw this discussion to a close. It would be of interest to us to know, though, the procedure to be followed should a municipality or industry wish once again to train its apprentices under the Metal Industries Act, having been prohibited from doing so.

L.H. Hare (C.O.T.T.): Mr Quizmaster, the answer to that question is that the matter is always open to review, should a submission be made to the Registrar. Once convinced that a genuine effort was being made to train apprentices to a certain schedule of training, I feel sure that he would view such an approach sympathetically.

In reply to the last speaker, Mr Quizmaster: there is no question of specialised training in order to pass the test only. Anybody who trains an apprentice to the schedule of training is training him for the trade test because the test is based on the schedule of training. Furthermore, we have one job where we have 6 resistances in a three-heat switch. There are 6 such jobs with 11 possible combinations. Anyone knowing all those has been very well trained indeed, Mr Quizmaster!

PRESIDENT (interjected): Gentlemen, as you know this is a session for

the Cape of Good Hope Branch as well as the Cape Eastern Branch so I will now call on Mr Dreyer to share the rostrum with Mr Murphy so that we can handle the rest of the questions in the priority they may choose.

QUIZMASTER (H.C. Dreyer): Thank you, Mr President. We will now deal with the questions in the Good Hope Branch Session which are of more general interest.

QUESTION 4: A recent enquiry for underground power cables elicited a tender from a manufacturer of unarmoured cross-linked polyethylene single core cables at a price substantially less than that asked for the conventional underground P.V.C. - insulated armoured cable. Would the installation of this type of cable, laid direct in the ground without any additional physical protection, comply with regulation C.53 (Safe selection and erection) of the Factories, Machinery and Building Work Act? (Strand)

As you all know, Regulation C.53 has a very wide scope and interpretation and I think this could be discussed very fruitfully. Before asking Mr Wannenburg for his comments on this, I'd like to solicit any comments from the floor.

Are there any engineer members present who have used this type of cable? I understand one town on the Reef has been using it.

H. Barnard (Brakpan): Mnr. die Vraesteller, ek wil nie hê dat julle nou moet beginne kibbel oor hierdie klas van kabel nie want ons het dit reeds aangekoop en daar is nie nou tyd vir omdraai nie! Die kwessie van die veiligheid van die kabel het lang besprekings uitgelok onlangs by een van die Hoëveldtak se vergaderings. Ek dink mnr. Theron het egter meer onder-vinding van hierdie saak as ons want hulle is alreeds driekwart klaar met hulle installasie en ons is maar net besig daarmee.

Ons het darem die saak baie goed oorweeg en ons het gevind dat die kans vir onveiligheid hier is maar baie skraal want die kabel word in die

eerste/...

eerste instansie 3 voet onder die grond begrawe en dit is dus baie onwaarskynlik dat enige iemand hierdie kabel gaan opgrawe behalwe opgeleide personeel of personeel wat woontlik direk met 'n munisipale onderneming te doen het.

In elk geval, 'n mens het dieselfde soort probleem met hierdie soort van kabel as wat jy het met die bogrondse lyn wat nie 'n beskermende laag om die kabel heen, en dus 'n gevaarlike situasie kan veroorsaak as dit miskien afbreek en oop lê op die grond. Ons het gereken hierdie poliëtileen kabel met sy taai omhulsel is heeltemaal veilig vir die doel waarvoor ons hom wil gebruik.

WRAESTELLER: Dankie, mnr. Barnard. Mnr. Theron, kan u vir ons miskien enige inligting gee omtrent hierdie tipe van kabel?

U.C. Theron (Vanderbijlpark): Mr Quizmaster, I didn't know whether I am qualified to speak since we are not 'on the Reef'. In any case, I think Mr Barnard has virtually answered the question by making this comparison with overhead lines. It boils down basically to the fact of what protection you are prepared to employ.

So long as you take reasonable precautionary measures, I think this is as much as can be expected. In our own case the cable is buried 3 feet (1 metre) deep in the ground; in addition to which these cables are only laid in specific reserves. We also include the warning tape which was mentioned earlier. We feel that all this should be quite adequate safety measures including the fact of the very tough insulation used on this particular cable.

A further possibility, Mr President, is that you can use a sensitive earth-leakage protection device provided you don't run as a PME system; and this you can make as sensitive as you wish. We are looking into this at the moment but haven't finalised on it as yet. Thank you, Mr Quizmaster.

QUIZMASTER: Thank you, Mr Theron. Could you tell us whether you use this cable on public as well as private ground?

G.C. Theron (Vanderbijlpark): This cable is only being used on public ground in standardised reserves, Mr Quizmaster.

E.E. de Villiers (Rustenburg): Mnr. die Vraesteller, ek wil nie nou graag mnr. Wannenburg vooruitloop nie, maar hy het oor die jare vir my geleer ons moet die wet haarfyn lees. Dit staan in die Afrikaans C.53 (1): „Die gebruiker moet (i) alle elektriese toestelle en geleiers so kies, opstel, installeer, beskerm, bedien en onderhou dat gevaar vir persone so ver doenlik uitgeskakel word.”

Na die beste van my wete is dit so gestel dat hulle nie haarfyn kan neerlê vir elke kommoditeit presies wat doenlik is nie. Dus glo ek dat mits die ingenieur na die beste van sy vermoë vir veiligheid, 'n sekere toestel installeer en daar sou iets gebeur is hy heeltemaal binne die perke van die wet.

Ons het nog nie die laagspanning kruisgekoppelde poliëtileen kabel gebruik nie maar ons dink ernstig daaraan. Ek het myself tevrede gestel dat iemand met 'n pik baie gouer groot skade kan aanrig en gevaarlike toestande skep op die PVC draad gepanteerde kabel as op hierdie poliëtileen kabel met geen ekstra beskerming om; want 'n redelike skerp voorwerp is geneig om verby die isolasie af te gly in die laasgenoemde geval. Daarom reken ek daar is eintlik minder gevaar met dié kabel as met die ou tipe PVC kabel. Dankie.

VRAESTELLER: Dankie, mnr. de Villiers. Enige iemand anders? Surely some of our commercial associates have had experience or know of experience with this type of cable overseas, especially in America.

D.L. Condra (Usco Cable Co. (Pty) Ltd., U.S.A.): Thank you, Mr Quizmaster. I didn't want to get up and do any selling but I can say, for the benefit of those who are not aware of it, that this is a standard cable used in the United States and has been in use there for about 10 years now. The number of feet of this cable installed in the ground approaches a billion and to date all our enquiries in the United States have not elicited a single

report of even a serious injury due to someone digging into this cable. We've contacted major utility companies as well as the Government Rural Electrification Administration neither of which have had any reports of fatalities or injury.

I think I need say no more other than that it is accepted by U.L. and the National Electric Code for house services i.e. service connections to houses. We feel, therefore, that it has proved itself in the United States and that there are no applicable special conditions in South Africa which preclude its use here. Thank you.

QUIZMASTER: Could you just tell us what voltages you are using in America, Mr Condra ?

D.L. Condra (replied): The American system is basically 220V centre tap single phase which is, of course, 110V to ground. However, it is approved for use to 300V to ground by the National Electric Code for house services.

QUIZMASTER: Thank you, Mr Condra. If there are no more comments I will now call on Mr Wannenburg to give us his interpretation of this question.

J.G. Wannenburg (Department of Labour, Pretoria): mnr. die Vraesteller, ek is bly om te hoor dat daar darem een ingenieur is wat ek al so bietjie opgelei het! Dankie vir die kompliment, mnr. de Villiers! (gelag)

In hierdie geval gaan ek net so gerieflik by die agterdeur uitglip want Reg. C.53 plaas die onus van keuse van daardie soort van materiaal 'n honderd persent op die gebruiker. Dit sê hoegenaamd niks van watter soort kabel of masjinerie jy moet gebruik of hoe jy dit moet gebruik nie. Anders as met bopgrondse geleiers waar ons wel kontrole uitoefen, is daar geen kontrole sover dit ondergrondse kables betref nie. So dis oor na u, menere!

VRAESTELLER: Dankie, mnr. Wannenburg. Kan ek u net vra as u nou 'n distribusie ingenieur gewees het en u wou voldoen het aan die veresites van C.53,

hoe sou u te werk gegaan het met hierdie kabel ?

J.G. Wannenburg (Departement van Arbeid, Pretoria): Julle gaan my seker kwalik neem, net soos gister wanneer iemand my gevra het watter aardlekskasie toestelle ek sou verkies, maar ek trap in die modder as ek hierdie tipe vraag beantwoord! (gelag)

J.L. McNeil (Kokstad): Mr Quizmaster, I wonder if Mr Condra could tell us what he uses for his primary reticulation, as opposed to the secondary already mentioned.

D.L. Condra (Usco Cable Co. (Pty) Ltd., U.S.A.): in the United States, as many people are aware, there is a special type of UMD cable used for primary reticulation. Does that answer your question ?

QUIZMASTER: Mr Condra, I think we would like more detailed information about your primary system - the voltage and the type of cable used.

D.L. Condra (replied): Standard voltages are determined by the independent utility companies in the United States. However, they do standardise to a certain extent and are moving more and more to the higher voltages.

About the lowest common standard voltage is 12,5kV phase to phase, but more and more are changing to 25kV phase to phase, feeding relatively small pad-mounted transformers (by small 1 mean 100kva and below).

Normally single phase primary distribution consists of a cable with a primary core which is generally aluminium today with a concentric neutral of 10 copper wires which is in direct contact with the earth and buried in the trench directly.

QUIZMASTER: Thank you, Mr Condra. Gentlemen, if there are no more contributions forthcoming, then I will hand over once again to Mr Murphy.

QUIZMASTER (K.J. Murphy): Gentlemen, we will turn now to the Cape Eastern Branch Session:

Question (d): STANDING ORDERS : MUNICIPAL STAFF

most large Undertakings issue their employees with a set of "Standing Orders" re safety measures to be observed when working on various sections of the distribution network e.g. switching procedure, protective clothing to be worn, etc., etc. Whilst certain "Orders" may be peculiar to a particular undertaking, the most must be common to all.

Could not the A.M.E.U. draft a standard set of "Standing Orders" to the approval of the Chief Inspector of Machinery ?

Small Undertakings, in particular, would find it of great value.

I don't know what the reaction will be to this but many of these "orders" have come about through trial and error and this experience could prove of great benefit to the smaller undertakings. Over to you, gentlemen.

H.C. Dreyer (Paarl): Mr. die Vraesteller, ek wil graag in my gewone hoedanigheid deelneem aan hierdie bespreking.

Ons het in my tuisdorp al vir baie jare al die standaard kode vir personeel in gebruik. Dit dek sover moontlik standaard instruksies aan die personeel om sover as wat ons kan voorsien, te voldoen aan die vereistes van die Fabriekewet aan die eenkant, en die Pad Ordonansie, ten opsigte van die gebruik van voertuie, aan die anderkant; asook ons eie plaaslike, huis-houdelike reëls soos uitreiking van materiaal, gebruik van materiaal, veilige berging en die kras van dinge.

Ek kan u dus die versekering gee dat hierdie staande instruksies van baie waarde kan wees vir die personeel sowel as die departement. Ongelukkig bestaan die omstandighede egter dat jy personeel kry wat van ander plekke afkom en al so geïndoktrineer is in gewoontes en Metodes wat botsend is met jou eie reëls, dat jy baie moeite ondervind om hulle sover te kry om hierdie te aanvaar; en in baie gevalle vind jy dat hulle lees dit nie eers

behoorlik/...

behoorlik nie.

'n Dokument van hierdie aard wat deur al die voorsieningsowerhede gebruik kan word, behoort baie by te dra om veiligheid in hierdie bedryf in die algemeen te bevorder. Dankie, mnr. die Vraesteller.

VRAESTELLER: Dankie, mnr. Dreyer. U weet, menere, die vertaling hiervan in Afrikaans „Reglement van Orde“ is maar my eie idee soos wat ek dit uit 'n woordeboek gekry het. Dit klink baie indrukwekkend maar u mag miskien 'n beter woord daarvoor hê.

Ek aanvaar dat groot stede soos Johannesburg en Durban so 'n reglement van orde reeds besit, maar wat van die kleiner plekke?

J.G. Wannenburg (Departement van Arbeid, Pretoria): Mnr. die Vraesteller, as ons nou myningengineurs was en ons het die Myn- en Bedrywe Wet hier bespreek, dan sou die antwoord hierop maklik gewees want weens die magtigingsklousule is dit moontlik om dit verklaar te kry as wet deur die Minister. Maar ongelukkig is dit nie so onder die Fabriekswet nie en al is dit prysenswaardig, mag ek dit nie goedkeur nie want daar is geen magtigingsklousule in die wet daarvoor nie.

Daarom moet u baie versigtig wees want hoe gaan u hierdie reëls handhaaf? Die wet stand van hierdie regulasies wat u wil opstel is baie swak; eintlik is daar geen wet stand nie. Yskor self het van die beste huishoudelike reëls maar dit is nie eers die papier werd waarop dit staan nie, want hulle het dit nog nooit laat goedkeur nie.

E. de C. Pretorius (Potchefstroom): Mnr. die Vraesteller, ek wil u net verwys na artikel 40 van die Wet op Fabriek, Mynwese en Bouwerk waar dit staan dat wanneer 'n werknemer versuim om iets te doen, waardeur 'n ongeluk gebeur „... word veronderstel dat die gebruiker self die daad of versuim begaan het, en hy kan ten opsigte daarvan skuldig bevind word“.

As dit nou u idee is om verby dié artikel van die Wet te kom, is u op baie gevaarlike grond. In dié verband wil ek u graag verwys na mnr.

Wannenburg se antwoord op vraag 16 wat by die Kaapstad se konvensie aan hom gestel was (bl. 15 van die Verrigtinge, deel 2 (a) van 71). Dankie.

J.G. Wannenburg (Departement van Arbeid, Pretoria): Mr. die Vraesteller, as julle ingenieurs enige iets wil doen, dan moet julle gebruik maak van artikel C.2,d... Geboorsaamheid aan instruksies. Dit is egter heeltemaal onmoontlik om vir alle munisipaliteite in die land 'n standaard stel van regulasies op te stel want geen twee munisipaliteite dink dieselfde nie.

H. Barnard (Brakpan): Mr. die Vraesteller, toe ek hierdie deel van die vraag gelees het, het die gedagte by my opgekóm dat dit nie juis is om die wet te ontduik nie, of om verantwoordelikheid af te skyf nie, maar dit is eerder om as 'n handleiding te dien. Soos u weet, in 'n munisipaliteit is daar sekere pligte wat aan 'n pos verbonde is, asook sekere metodes waardeur elke individuele ingenieur graag wil hê dat dit uitgevoer moet word.

Deesdae met die gereelde omsat van personeel voel ek dat so 'n reglement van orde soos hierdie is 'n noodsaaklikheid want bv. 'n elektrisiën wat jare lank in 'n myn of in die nywerheid gewerk het, het maar weinig kennis van 'n munisipale instansie.

Dit sal maar bra moeilik gaan om vir elkeen van hierdie mense 'n spesiale opleidingskursus te gee, maar so 'n standaard reglement van orde sal hulle ten minste die beginsel gee waarop hulle moet werk. Die man moet nog vir homself dink, want as hy miskien 'n reglement van orde kry wat iets voorskryf wat hy voel is onveilig om daarvolgens te werk, dan is dit nog sy verantwoordelikheid om te sien dat hy die veiligheid daarvan handhaaf.

Om dié rede voel ek dat dit miskien nie moontlik is om 'n standaard op te stel nie want elke voorsiener het sy eie idees hieromtrent. Maar as daar ten minste 'n poging aangewend word om gesamentlik iets op te stel wat as 'n leiding kan dien vir die kleiner dorpies, sal dit hulle baie baat om die veiligheid van hulle individuele voorsienningsgebiede te bevorder.

VRAESTELLER/...

VRAESTELLER: Dankie, mnr. Barnard. Ek dink u het dit baie mooi saamgevat.

P.J. Botes (Roodepoort): Mnr. die Vraesteller, vir my lê die antwoord in die opstel van standaard praktyk instruksies waarin die hele orde uiteengesit is van A tot Z - hoe skakelwerk uitgevoer moet word, hoe ons 'n minisub op te koppel ens. Daarin lê vir my veel meer waarde as in hierdie instruksies aan personeel want ek kan u verseker niemand lees dit eers nie. Ek het ook sulke instruksies, 'n oorerwing van jare terug. Elke keer as ons 'n ongeluk het, dan voeg ons maar nog 'n stukkie by, maar dit het eintlik geen nut nie. Dankie.

H.C. Dreyer (Paarl): Mnr. die Vraesteller, ek wil net graag aan mnr. Wannenburg meedeel dat ons wel werk soos hy voorgestel het, so enige kode of staande instruksies is wel regsgeldig. Ons tree wel op onder die Fabriekswet waar dit gestel word dat enige instruksie wat aan 'n werkmans ter bevordering van veiligheid uitgereik was en hy dit doelbewus verontagsaam het; dis 'n kriminele oortreding.

Eintlik kan jy dit laat insluit in jou diensvoorwaardes as deel van jou dienskontrak; dat hy daardie kode sal eerbiedig. Ons het onlangs opgetree in twee of drie gevalle en ten spyte van die feit dat die betrokke werknemer regsverteenvoordiging gehad het, het hy sy saak verloor. Dankie.

J.G. Wannenburg (Departement van Arbeid): Mnr. die Vraesteller, ja, dis heeltemaal korrek, maar bly asseblief by die woorde „instruksie" en „taakomskrywing". Dit val egter nog onder C.2 want daar gee jy die man 'n instruksie; of dit nou mondeliks is of geskrewe is, bly dit nog van krag.

Maar om voor te stel dat julle vir ander Munisipaliteite 'n standaard gaan opstel en my goedkeuring daarop soek is weer 'n ander saak. Ek herhaal, ek het nie die magte om dit te doen nie; niemand in die Departement het die magte om dit te doen nie. Die moeilikheid ontstaan eers as jy iemand na die hof sleep op aanklag dat hy nie volgens die kode gewerk het nie. Die slim prokureur sal sommer gou vra waar is jou instruksies.

H.C. Dreyer/...

H.C. Dreyer (Paarl): Mnr. die Vraesteller, by wyse van afluiging: hierdie is 'n saak van primêre belang vir al ons ingenieurs, en ek wil voorstel dat ons nie sommer net ligtelik hiervan afstap nie. In die lig van wat mnr.

Wannenburg gesê het, en in die lig van die metode waarvolgens hierdie kodes reeds gebruik word, dink ek behoort 'n mens eintlik 'n voorstel te kon kry dat 'n standaard praktykskode wel opgestel word as 'n hand-leiding vir ingenieurs. Miskien kan so 'n kode dan net aan die Hoof-fabrieksinspekteur voorgelê word vir sy kritiek of kommentaar, sonder dat dit enigins gekoppel of geassosieer raak met wetgewing. Dankie.

E.de C. Pretorius (Potchefstroom): Mnr. die Vraesteller, ek wil formeel voorstel dat hierdie saak verwys word na die Uitvoerende Komitee.

VRAESTELLER: Baie dankie, mnr. Pretorius.

PRESIDENT (interjected): Gentlemen, we only have time for one more question so I'll ask the respective Quizmasters to pick out one more important question.

QUIZMASTER (H.C. Dreyer): Thank you, Mr President, I'm sorry there is such a shortage of time as there are quite a few questions left which would invoke lively discussion. However, we will handle one last question from the Good Hope Branch Session.

Question 6: Is it the responsibility of the electrical engineer to determine whether a particular location constitutes a hazardous location in terms of the Code of Practice 'The classification of hazardous locations for the selection of electrical apparatus for the use in such locations.' (S.A.B.S. 010c/1909? This question is framed having a panel beating and spray painting shop in mind. (Strand)

These problems, common to many undertakings, occur particularly with machines which have been manufactured overseas and violate certain safety

regulations such as that specifying that any power plug in an explosive or inflammable atmosphere shall be mounted at least 4'6" from the ground, or it should be flame-proof. Have you any views on the subject, gentlemen?

E. Trautman (LadySmith): Mr Quizmaster, I should like to add a further question if I may. We have recently been asked to permit a submerged pump in a petrol tank. Would that constitute a 'hazardous location', and how should we deal with such a request?

J.G. Wannenburg (Departement van Arbeid, Pretoria): Regulasie C.58 lees dat die onus berus by die gebruiker. As u benedinge het oor enige plek, tree gerus in verbinding met die naaste kantoor van die Departement van Arbeid en vra om 'n inspekteur om ondersoek te gaan instel. Basies berus die onus egter by die verbruiker.

VRAESTELLER: Mnr. Wannenburg, in hierdie geval dink ek hang dit van die definisie van gebruiker af. Ek glo nie dat die munisipale ingenieurs in sulke gevalle as gebruikers kan gedefinieer word nie. Dit is wel die eienaar van die garage.

Die vraag ontstaan nog al die tyd: is dit die verantwoordelikheid van die distribusie ingenieur om te bepaal of dit 'n gevaarlike situasie is of nie? Dit lyk of mnr. Wannenburg reken dit is nie sy verantwoordelikheid nie. Dankie, mnr. Wannenburg.

E.E. de Villiers (Rustenburg): Mnr. die Vraesteller, u is almal seker nou reeds in besit van die nuutste publikasie van sekere bewysings van die Bedradingsregulasies. Daarin staan 'n nuwe woordomskrywing bygevoeg om duideliker te maak. In Engels lees dit: "A hazardous location is one in which fire or explosion may occur owing to the presence of gases, vapours, dust or fibres that are flammable or explosive in the air".

Aangesien dit nou deel is van ons Bedradingsregulasies, voordat ons krag aanskakel na so 'n installasie moet ons tog darem seker maak dit gaan veilig wees. Dankie.

H. Barnard (Brakpan): Mnr. die Vraesteller, dit was al herhaaldelik in die verlede gevra wie word verantwoordelik gehou vir enige bedradingswerke ens. by 'n fabriek. Soos ons almal weet, die verantwoordelikheid van daardie bedradingswerk is dié van die Departement van Arbeid. Soos ek die saak sien kom hierdie gevaarlike kondisies gewoonlik voor in 'n fabriek. Dus hoef die distribusie ingenieur nie bekommerd te wees daaroor nie.

VRAESTELLER: Dankie, mnr. Barnard. Om hierdie vraag dan net af te rond; dit lyk vir my die algemene mening is dat dit eintlik nie werklik die verantwoordelikheid van die ingenieur is nie, maar wel die verbruiker. So die fabrieksinspekteurs kom ook hier in die gedrang.

J.G. Wannenburg (Departement van Arbeid, Pretoria): Mnr. die Vraesteller, mag ek net sê dat C.58 is geheel en al oorgeskryf en sal binnekort herpubliseer word. Dan sal u al u antwoorde kry.

VRAESTELLER: Mnr. die President, baie dankie vir die geleentheid aan die Goeie Hoopstad om hierdie forum te kon waarneem.

A.J. Murphy (Quizmaster: Cape Eastern Branch): Mr President, on behalf of the Cape Eastern Branch, thank you very much. (applause)

PRESIDENT: Well, gentlemen, this virtually winds up the Technical Meeting for 1972. In my opinion it has been a very successful one and I'm sure that here I am expressing the general view of all the delegates.

The innovation of having more of a forum session rather than just having papers delivered to us has proved very acceptable and it is my recommendation that we proceed along these lines at our future conventions as well. I would suggest further that questions of this nature be submitted to the Secretaries early so as to afford us advance information. This can perhaps be taken up further by the Standing Committee.

At this stage of the proceedings I would like to thank all the authors of papers and all those who participated in the discussions and in this way

made possible the success of this meeting. I think you will all agree that it's been of quite a high standard.

Other people I'd like to thank on this occasion are Mr Botha and Mrs Kleb of Sonex Recording Studio. I think the sound services here have been excellent.

Dan wil ek nie nalaat om mr. Piet Conradie te bedank vir die vertalings.

U het al seker gehoor hoe vinnig dit gaan; hoe hy die reukryk weet ek nie.

Ek vra verskoning, mr. Conradie, dat ek u nie in Kaapstad bedank het nie, maar ek bedank u nou formeel daarvoor.

Our thanks go also to the Secretaries, Mr Ewing, Miss Brewin and Mrs MacAdam and, last but not least, a very big thank you to Mr Len Fitcher

for the part he has played in this Technical Meeting and for laying on transport as well. Mr Fitcher, would you please convey our sincere thanks

to your Mayor and full Council for the cocktail party which we so thoroughly enjoyed last night. (applause)

Heel laaste, dame en here, wil ek graag mr. Pretorius bedank dat hy vir ons

Onderpresident ingestaan het tydens hierdie sessie. Baie dankie, Eugene, vir jou hulp en bystand. Ek het dit baie waardeer.

R.W. Barton (interrupted): Mr President, before you finally close, may

I claim the privilege on behalf of us all, of thanking you most sincerely

for the very considerable effort you yourself have made towards the success of this meeting, and for the manner in which you have conducted it.

Namens ons almal, mr. die President, baie dankie. (heartlike applause)

PRESIDENT: Dankie, mr. Barton. Well, gentlemen, I'd like to wish you

all a safe journey home and I look forward to meeting you all again

in Pietermaritzburg in 1973. Thank you, gentlemen, for your presence and your patience.

MEETING ADJOURNED

