

SAFETY IN MINES RESEARCH ADVISORY COMMITTEE (SIMRAC)

THE SAFE USE OF MINE WINDING ROPES

CSIR Mine Hoisting Technology

SIMRAC Project No. GAP 054

Johannesburg, South Africa

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OVERVIEW

The South African Safety in Mines Research Advisory Committee, known as SIMRAC, was established in terms of Section 29 (9) (a) of the South African Minerals Act, (Act 50 of 1991) with the principal objective of advising the Mine Health and Safety Council on the determination of the safety risk on mines, and the need for research into safety on mines based on the safety risk.

SIMRAC identifies research projects to address and reduce safety risks on mines, and determines the cost and priorities of projects, concludes agreements for carrying out projects, imposes a levy to fund research, monitors the progress on these projects and communicates research results to all stakeholders.

The final report on the SIMRAC funded project, The Safe use of Mine Winding Ropes, consists of seven volumes. Volume 1 presents an overview of the entire project. The other volumes are collections of relevant research reports. A total of 29 reports and a summary report were generated covering the subjects of:

- Recommendations for changes in rope safety factors.
- Rope terminations.
- Code of practice for rope condition assessment.
- Training manuals for incumbent rope inspectors.
- Code of practice for performance, operation, testing and maintenance of drum winders relating to rope safety.
- Forces acting in sinking winder ropes.

The schedule below lists all the volumes of the final report:

Volume 1 : EXECUTIVE SUMMARY

Volume 2 : RECOMMENDATIONS FOR CHANGES IN ROPE SAFETY FACTORS

Hecker, G.F.K. (1993), *Motivation for proposed changes to Chapter 16 of the Minerals Act: Rope Safety Regulations for Drum Winders*, CSIR Contract Report MST(93)MC1674, June 1993.

SABS Working Group 2 (1996), *Draft Code of Practice for the Performance, Operation, Testing and Maintenance of Drum Winders relating to Rope Safety*, Document submitted to the South African Bureau of Standards, April 1996. Recommendations were later incorporated into : *SABS 0294 Edition 1 : Code of practice for the performance, operation, testing and maintenance of drum winders relating to rope safety*, South African Bureau of Standards, Pretoria, 2000.

Volume 3 : ROPE TERMINATIONS

Borello, M. (1993), *Laboratory evaluation of white metal and resin cappings for use as winder rope terminations*, CSIR Contract Report MST(93)MC1838, Johannesburg, November 1993.

Borello, M. (1994), *Splicing techniques for mine winder ropes*, CSIR Contract Report MST(94)MC2260, Johannesburg, October 1994.

Borello, M. (1994), *Performance of resin filled sockets prepared by the mining industry*, CSIR Contract Report MST(94)MC2166 No.940155, Johannesburg, November 1994.

Borello, M. (1994), *Performance evaluation of resin filled sockets used at Premier Diamond Mine*, CSIR Contract Report MST(94)MC2264 No.940226, Johannesburg, December 1994.

Van Zyl, M.N. (1995), *An investigation onto the behaviour and deterioration of winding rope tangent points on conveyance mounted compensating sheaves*, CSIR Contract Report MST(95)MC2491 No.950132, Johannesburg, May 1995.

Wainwright, E.J., Borello, M. (1995), *Rope terminations for mine hoisting applications*, CSIR Contract Report MST(94)MC2260 No.940236, Johannesburg, March 1995.

Volume 4 : CODE OF PRACTICE FOR ROPE CONDITION ASSESSMENT

Borello, M. (1994), *Results of tests on sections of discarded ropes*, CSIR Contract Report MST(94)MC21 22 No.940126, Johannesburg, June 1994.

Borello, M., Kuun, T.C. (1994), *The effect of cut wires on the strength of winding ropes*, CSIR Contract Report MST(94)MC2333 No.940286, Johannesburg, December 1994.

Wainwright, E.J. (1995), *Discussion of results of tests on discarded ropes in terms of the Draft Code of Practice for Rope Condition Assessment*, CSIR Contract Report MST(95)MC2470 No.950125, Johannesburg, May 1995.

James, A. (1995), *A Literature review of the use of magnetic testing of steel wire ropes, with particular regard to rope discard criteria*, CSIR Contract Report MST(95)MC2487 No.950131, Johannesburg, May 1995.

Wainwright, E.J. (1995), *Discussion of results of second series of tests on discarded ropes in terms of the Draft Code of Practice for Rope Condition Assessment*, CSIR Contract Report MST(96)MC2887 No.960167, Johannesburg, May 1995.

Hecker, G.F.K., Kuun, T.C. (1996), *Further tests to study the effect of cut wires on the strength of winding ropes*, CSIR Contract Report MST(96)MC2333 No.960171, Johannesburg, April 1996.

Volume 5 : TRAINING MANUALS FOR INCUMBENT ROPE INSPECTORS

Wainwright, E.J. (1996), *Module 1: Study guide for wire rope inspectors*, CSIR Report MST(96)MC2886 No.960166, Johannesburg, February 1996.

Wainwright, E.J. (1995), *Module 2: An introduction to mine winders*, RCA Training Manual, Johannesburg, September 1995.

Wainwright, E.J. (1994), *Module 3: Technology of wire ropes for mine winding in South Africa*, RCA Training Manual, Johannesburg, 1994.

Kuun, T.C. (1995), *Module 4: Magnetic rope testing instruments*, RCA Training Manual, Johannesburg, November 1995.

Kuun, T.C. (1995), *Module 5: Practical aspects of rope inspection*, RCA Training Manual, Johannesburg, November 1995.

Borello, M. (1992), *Module 6: Destructive testing of wire ropes*, CSIR Internal Report MST(92)MC1212, Johannesburg, July 1992.

Borello, M., Hecker, G.F.K. (1994), *Module 7: Rope deterioration reference book*, RCA Training Module, Johannesburg, December 1994.

Volume 6 : CODE OF PRACTICE FOR THE PERFORMANCE, OPERATION, TESTING AND MAINTENANCE OF DRUM WINDERS RELATING TO ROPE SAFETY

Kroonstuiwer, J. (1994), *Investigation into rope forces generated during emergency braking events*, CSIR Contract Report MST(94)MC2208 No.940189, Johannesburg, September 1994.

Hecker, G.F.K. (1994), *Rope force measurements during emergency braking*, CSIR Contract Report MST(94)MC2208 No.940190, Johannesburg, September 1994.

Kroonstuiwer, J. (1994), *Investigation of forces in a 4000 m mine winding rope resulting from a motor fault torque*, CSIR Contract Report MST(94)MC2208 No.940192, Johannesburg, September 1994.

Hecker, G.F.K. (1995), *Rope deterioration: Field study requirements and recommendations*, CSIR Contract Report MST(95)MC2450 No.950107, Johannesburg, March 1995.

Kroonstuiwer, J. (1995), *Load ranges during a normal winding cycle*, CSIR Contract Report MST(95)MC2573 No.950189, Johannesburg, June 1995.

Volume 7 : FORCES ACTING IN SINKING WINDER ROPES

Van Zyl, M.N. (1995), *Rope force measurements during shaft sinking operations at Vaal Reefs 11 Shaft*, CSIR Contract Report MST(95)MC2736 No.950373, Johannesburg, December 1995.

Van Zyl, M.N. (1996), *Rope force measurements during shaft sinking operations at West Driefontein 10 Shaft*, CSIR Contract Report MST(96)MC2736 No.950374, Johannesburg, January 1996.

Van Zyl, M.N. (1996), *Rope force measurements during shaft sinking operations at West Driefontein 9 Shaft*, CSIR Contract Report MST(96)MC2736 No.950375, Johannesburg, February 1996.

OTHER SIMRAC GOLD AND PLATINUM WINDER ROPE RELATED REPORTS

Hecker, G.F.K., van Zyl, M.N., Wainwright, E.J., Goosen, P., Heydenrych, C. (1997), *GAP 324 - Deterioration and discard of mine winder ropes*, Volumes 1 and 2, CSIR Materials Science and Technology, Johannesburg, September 1997.

Van Zyl, M.N., Hecker, G.F.K. (1998), *GAP 418 - Catalogue of best practices for the ropes and winders of deep shaft sinking operations*, CSIR Materials Science and Technology, Johannesburg, November 1998.

Hecker, G.F.K., Wainwright, E.J., Heydenrych, C. (1998), *GAP 439 - Deterioration of mine winder ropes*, CSIR Materials Science and Technology, Johannesburg, July 1998.

Van Zyl, M.N. (2000), *GAP 501 - Deterioration mechanisms of drum winder ropes*, Mike Van Zyl Incorporated, Pretoria, December 2000.

Van Zyl, M.N. (2000), *GAP 502 - Discard criteria for mine winder ropes*, Mike Van Zyl Incorporated, Pretoria, September 2000.

Dohm, M.A.R. (1999), *GAP 503 - An evaluation of international and local magnetic rope testing instrument defect detection capabilities and resolution, particularly in respect of low rotation, multi-layer rope constructions*, AATS - Division of Anglo American Corporation of South Africa, Project Numbers GAP 503 and GAP 535, Johannesburg, May 1999.

Van Zyl, M.N. (2002), *GAP 637 - Technology transfer of winder ropes research*, Mike Van Zyl Incorporated, Pretoria, July 2002.

Hecker, G.F.K. (2004), *GAP 803 - Develop Discard Criteria for Non-spin Wire Ropes*, Mechanical Testing and Measurement, January 2004

O'Brien, T.M. (2004), *GAP 836 - An investigation into the effects of steel wire rope specimen length on breaking force*, CSIR Division of Mining Technology, March 2004.

All the SIMRAC GAP reports and volumes are available for download in Adobe Acrobat PDF format from:

<http://www.simrac.co.za>