MINIMUM PHYSICAL REQUIREMENTS FOR THE PHYSICAL WORKERS OF AN ELECTRICITY SUPPLY COMPANY BY WAY OF WORK-SPECIFIC PHYSICAL ASSESSMENTS

by

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Submitted for the fulfilment of the requirements for the degree

Magister Artium (HMS)

in the

Faculty of Humanities
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Pretoria

October 2003

DEDICATION

This dissertation is dedicated to my parents, Leon and Ria Bester, for their unwavering support and encouragement through all the years of my life, for their endless belief in my abilities, and for their unselfish love for their sons.

ACKNOWLEDGEMENTS

To my Lord, without whom nothing is possible.

I also wish to acknowledge the following individuals:

Prof. PE Krüger	: My promoter, for believing in the idea from start to finish, for sharing his knowledge and ideas, and for allowing me the freedom to do things my own way.
Japie Lubbe	: For his expert advice, and his assistance in the gathering of relevant literature.
My brother, André Bester	: For building the "work-specific" test equipment used during this study.
Esmarie Pretorius	: For her expert inputs as an ergonomist and biokineticist, and for her assistance in the gathering of the data.
Christine Smit	: For her assistance with the statistical analysis of the data.
My wife, Elana Bester	: For standing by me through all the challenges of life.

CONTENTS

CHAPTER 6: SUMMARY, CONCLUSION AND RECOMMENDATIONS

SYNOPSIS

Title	: Minimum physical requirements for the physical workers of an electricity supply company by way of work-specific physical assessments
Candidate	: George Francis Bester
Promoter	: Prof. P E Krüger
Department	: Biokinetics, Sport- and Leisure Science
Degree	: MA (Human Movement Science)

The aim of this study was to identify and design a battery of work-specific physical tests for the physical workers (blue collar workers) within one of the departments of a South African electricity supply company (SA ELEC), and to establish work-specific minimum physical requirements (MPR) for the relevant jobs. The idea was to establish one powerful and complete measuring tool, which consists of MPR for the physical "factor" tests that are already in use in SA ELEC, as well as MPR for the work-specific tests - the result of this study.

An objective measuring tool such as this, and the pro-active measures that can be put in place as a result, holds many advantages for a company with a physical work force and its employees:

(i) the placement of employees in suitable jobs;
(ii) the early identification of employees that do not possess the physical capacity to do their jobs effectively and safely;
(iii) reductions in sick leave, injuries on duty, ill-health applications; and employee turn-over rate;
(iv) improvement in productivity, attitude, and employee satisfaction;
(v) reductions in cardiac risk; and
(vi) improvement in individual physical ability and lifestyle habits.

This study focussed on the whole process of establishing MPR for a job, which included the following critical aspects:

(i) literature review;
(ii) job analysis;
(iii) test design (including a validity study);
(iv) data collection and -analysis; and
(v) establishing minimum physical requirements (MPR).

The following table shows the names of the tests that were used during this study, as well as the MPR that were calculated:

Tests	MPR	SI
arm strength above the head	35.8	kgf
lifting strength from the floor (right)	61.25	kgf
lifting strength from the floor (left)	60.32	kgf
arm adduction strength	44.40	kgf
shoulder endurance at eye level (right)	34.10	sec
shoulder endurance at eye level (left)	28.70	sec
total of six tests	269.18	total

(kgf = kilogram force; sec = seconds)

Keywords

minimum physical requirements (MPR)
work-specific physical tests
physical factor tests
job analysis
physical ability
physical work capacity
blue collar workers
pre-employment screening
isometric strength testing
inherent requirements of a job

SAMEVATTING

Titel	: Minimum fisieke vereistes vir die werkers van `n elektrisiteitsvoorsieningsmaatskappy deur gebruik te maak van werk-spesifieke fisieke toetse
Kandidaat	: George Francis Bester
Promotor	: Prof. P E Krüger
Departement	: Biokinetika, Sport- en Vryetydswetenskappe
Graad	: MA (Menslike Bewegingskunde)

Die primêre doel van die studie was om `n battery werk-spesifieke fisieke toetse daar te stel, ten einde die fisieke werkers (blou-boordjie werkers) van een van die departemente van `n Suid-Afrikaanse elektrisiteitsvoorsieningsmaatskappy (SA ELEC) te toets en sodoende data in te samel vir die opstel van minimum fisieke vereistes (MFV) vir die relevante poste. Die idee was om `n kragtige en volledige toetsmetode daar te stel, wat bestaan uit MFV vir die fisieke "faktor" toetse, wat reeds gebruik word in SA ELEC, te same met MFV vir die werk-spesifieke toetse – die resultaat van hierdie studie.

`n Objektiewe toetsmetode soos die, tesame met die pro-aktiewe benaderings wat gebruik kan word as gevolg daarvan, hou verskeie voordele in vir `n maatskappy met `n fisieke werkerskorps en sy werknemers:

(i) die plasing van werknemers in gepaste poste;
(ii) die vroeë identifisering van werknemers wat nie oor die fisieke kapasiteit beskik om hul werk effektief en veilig te verrig nie;
(iii) `n afname in siekverlof, beserings aan diens, ongeskiktheidsaansoeke, en die tempo van werknemer vervanging;
(iv) `n verbetering in produktiwiteit, moraal, en werk-satisfaksie;
(v) `n afname in kardiale risiko; en
(vi) `n verbetering in individuele fisieke bekwaamheid en in gesondheids-gewoontes.

Hierdie studie het gefokus op die totale proses wat gevolg moet word wanneer die MFV van `n pos bepaal word. Dit het die volgende ingesluit:

(i) literatuurstudie;
(ii) posontleding;
(iii) toets-ontwerp (insluitende `n geldigheids-studie);
(iv) data insameling en –analise; asook
(v) die opstel van minimum fisieke vereistes (MFV).

Hier volg `n tabel met die name van die toetse wat gedurende die studie gebruik is, asook die MFV wat bereken is:

Toetse	MFV	SI
arm-krag bo kop	35.8	kgk
optel-krag vanaf die vloer (regs)	61.25	kgk
optel-krag vanaf die vloer (links)	60.32	kgk
arm adduksie-krag	44.40	kgk
skouer-uithouvermoë op oogvlak (regs)	34.10	sek
skouer-uithouvermoë op oogvlak (links)	28.70	sek
totaal van die ses toetse	269.18	totaal

(kgk = kilogram krag; sek = sekondes)

Sleutelwoorde

minimum fisieke vereistes (MFV)
werk-spesifieke fisieke toetse
fisieke faktor toetse
posontleding
fisieke bekwaamheid
fisieke werkskapasiteit
blou-boordjie werkers
voorindiensnemingstoetse
isometriese kragtoetse
inherente vereistes van `n pos

LIST OF ABBREVIATIONS

ADP	-	Adenosine diphosphate
ATP	-	Adenosine triphosphate
Beats/min	-	Beats per minute
BMI	-	Body Mass Index
CA++	-	Calcium
CAT scan	-	Computerized Axial Tomography scan
cm	-	centimetre
CO_2	-	Carbon dioxide
EEOC	-	Equal Employment Opportunity Commission
EMG	-	Electromiogram
FCA	-	Functional Capacity Assessment
FT fiber	-	Fast twitch muscle fiber
H+	-	Hydrogen
Kcal	-	Kilocalories
kg	-	Kilogram
kgf	-	Kilogram force
LSR	-	Lifting Strength Rating
ml/kg/min	-	Millilitre per kilogram body mass per minute
mmHg	-	Millimetre mercury
MPR	-	Minimum Physical Requirements
MPRS	-	Minimum Physical Requirements Sheet
MRI	-	Magnetic Resonance Imaging
N	-	Number of subjects
O_2	-	Oxygen
PC	-	Phosphocreatine
pH	-	Level of acidity
Pi	-	Inorganic phosphate
PNF	-	Proprioceptive Neuromuscular Facilitation
R	-	Rand
RPE	-	Rate of Perceived Exersion

SA ELEC	-	South African Electricity Supply Company
sec	-	Seconds
Std. Dev.	-	Standard deviation
ST fiber	-	Slow Twitch muscle fiber
VO_2 max	-	Maximal oxygen consumption / Aerobic capacity
1-RM	-	One-repetition maximum
$	-	United States dollar
%	-	Percentage

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