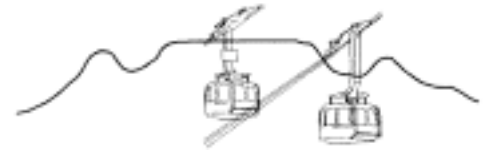




WCB ENGINEERING BULLETIN

The Institution of Certificated Mechanical and Electrical Engineers
Western Cape Branch (WCB)

P O Box 504, Rondebosch, 7700



APRIL 2008

- MISSION STATEMENT:**
1. To uphold the image and status of the Certificated Engineer.
 2. To represent the Certificated Engineer at ECSA and other decision-making bodies concerning legislation, safety & health standards, the environment and the machinery regulations.
 3. To promote continued education and training of its members and future engineers.
 4. Promote fellowship in the engineering profession.

EDITORIAL

Welcome to another edition of the Western Cape News Bulletin.

A recent development in the CPD process has been the concession that the category 1 points can be used from year to year i.e. should one attend seminar worth 2 points in year 1, one can claim the 2 points for 2 years at 1 point per year. This will lower the burden on having to attend a seminar every year and only being able to use one point.

In this edition we have some information on the GCC results and comments by examiners. It is interesting to note that the main reason for the poor results appear to be candidates being poorly prepared!

Further we have a continuation of the article on the electrification of Cape Town and the normal question and answer for GCC preparation.

I trust that you will find the content of this news bulletin interesting enough to pass on to your colleagues and friends.

Chris Schnehage

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Editor: Henriette Venter email: vencon@netactive.co.za

LOCAL BRANCH NEWS

Activities of the branch since last news bulletin were as follows:

The year kicked off with the AGM which was held on 19 February 2008. The guard on the committee has remained the same. An addition to the committee from the floor was Jonathan Hermanus from SAPPI. Welcome Jonathan.

At the same meeting we had a talk presented by Hentie Wickens of the College of Cape Town discussing the changes in the education for apprentices since the discarding of the Apprentice system.

We hosted a talk on mechanical seals on 25 March 2008. The turnout was good and the talk most interesting!

The line up for the next few months is as follows:

24 April 2008 – visit to the RMS St Helena when she docks in the Cape Town harbour.

May 2008 – electrical talk – subject still to be announced

June 2008 – visit to a spring manufacturer

July 2008 – visit to Ankerlig OCTG

August 2008 – COATEC – hard chrome and metal covering.

Should any member have an interesting visit at your factory or work place, please let us know so that we can arrange such a visit.

Later on in the year we intend to host a 1 day seminar titled "Occupational Health and Safety – Where do you fit in?" We would greatly like to hear from members whether you have something specific you would like to hear about or could contribute to the broad subject on the table.

We look forward to seeing you at one of our functions.

Check the following out if you like new inventions.

<http://www.disappearing-car-door.com/>

Ciao for now!

Chris Schnehage

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SAFENET THOUGHT FOR THE DAY

9 March 2007

Important news for users of lifting tackle!!

In previous Safety Thoughts we reported extensively on the legal requirements pertaining to the inspection and testing of lifting machines and lifting tackle. On the 18th of February 2005 the Department of Labour promulgated amendments to the Driven Machinery Regulations pertaining to the inspection and testing of lifting machinery. The amendment effectively resulted in it being a legal requirement that all inspections may only be conducted by a Department of Labour approved entity that employs persons registered for this purpose with the Engineering Council of Southern Africa. This even included the three monthly visual inspection of lifting tackle. These inspections in most cases would previously have been conducted by an employee of the company, but now a contractor had to be paid for this service.

This new legal requirement resulted in a major increase in the overheads of your engineering department. In our Safety Thought dated the 23rd of March 2008 we again raised the issue and stated that we are of the opinion that it was never the intention that lifting tackle needs to be inspected by above mentioned entities. We stated that we are of the opinion that is merely an oversight on the part of the person who drafted the amendments in that this person did not consider all the cross references made in these amendments.

Well, good news for all lifting tackle users. On the 7th of March 2008 the Department of Labour published a government notice in which extension of time is for the umpteenth time granted to persons who need to register with the Engineering Council of South Africa. More importantly is the last sentence in the gazette that states

"This registration does not apply to persons who examines lifting tackle in terms of regulation 18(10)(e) of the Driven Machinery Regulations". From our subsequent discussion with the Department of Labour it is clear that it is now their intention to exclude lifting tackle resulting in any competent person being able to conduct the three monthly inspection of lifting tackle. The regulation does not define competent but in the past it was common to find that artisans employed by a company would conduct the required inspections of lifting tackle.

Attached find a copy of the Government Gazette for your convenience.

STAATSKOERANT, 7 MAART 2008 No. 30529 3

GOVERNMENT NOTICES
GOEWERMENTSKENNISGEWINGS

DEPARTMENT OF LABOUR
DEPARTEMENT VAN ARBEID

No. R. 257 7 March 2008

**NOTICE OF EXEMPTION IN TERMS OF SECTION 40(1) OF THE
OCCUPATIONAL HEALTH AND SAFETY ACT, 1993**

DRIVEN MACHINERY REGULATIONS 18(5)

Under section 40 (3) (b) of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), I Jacob Pannye Malatse appointed as chief inspector in terms of section 27(1) of the said Act, and by virtue of the power delegated to me by the Minister of Labour in terms of section 42 (1) of the Act, hereby grant exemption in terms of section 40 (1) to applicants who have submitted their application for registration as lifting machine inspectors to the Engineering Council of South Africa (ECSA) before 30 September 2006 as per Government Gazette No. 28755 until 27 June 2008.

This registration does not apply to persons who examine lifting tackles in terms of regulation 18(10)(e) of the Driven Machinery Regulations.

J. P. Malatse Chief Inspector

SAFENET THOUGHT FOR THE DAY [2]

28 March 2008

Total ban on the use and sale of asbestos

As far back as November 2005 we reported that the Minister of Environmental Affairs and Tourism has published Draft Asbestos Regulations which will ban the use, processing and / or sale of asbestos or asbestos containing products. These regulations will finally be promulgated today. It should be noted that the regulations promulgated by the Department of Environmental Affairs and Tourism although also called the Asbestos Regulations will not replace the Asbestos Regulations promulgated under the Occupational Health and Safety Act, 1993.

The Asbestos Regulations promulgated by the Department of Environmental Affairs and Tourism mainly came about as a result of asbestos containing products being imported into the republic. Everite who manufactured most of our asbestos products stopped using asbestos in their manufacturing processes many years ago. This did however not stop others and in particular Zimbabwean companies from producing asbestos containing products. Many of these products are imported into South Africa and you would even today be able to buy asbestos and non asbestos (South African) containing roof sheets from the same hardware store. It should however be said that some of the more responsible hardware stores that we do work for decided years ago that they will not sell any asbestos or asbestos containing products. This is unfortunately not the case with all such businesses. In most cases the asbestos containing products are cheaper resulting in these products being more popular in certain markets. The

new Asbestos Regulations promulgated by the Department of Environmental Affairs and Tourism will hopefully help in stopping the sale of any further asbestos.

The Asbestos Regulations promulgated by the Department of Environmental Affairs and Tourism contains the following important provisions:

1. All merchants who still stock asbestos containing products are given 120 days from today to clear their stock. After the 120 days it will be regarded as illegal to sell the asbestos containing material.

This provision will also apply to others who remove asbestos containing roof sheets or old water tanks from an old building and then sell it to others. The person responsible for the demolition of the building will have no choice but to dispose of the asbestos product on a waste site approved for this purpose. In accordance with the provisions of the Asbestos Regulations promulgated under the OHS Act these products may not be disposed of on a municipal waste dump; and

2. Companies who still use asbestos in their manufacturing process must register with the Department of Environmental Affairs and Tourism. They are also required to submit a phase out plan to the department in which they state:
 - a. Reasons why asbestos is still being used; and
 - b. Timeframes in which the use of asbestos will be phased out.

The new regulations do however **not** require of persons or companies to remove and dispose of asbestos containing products that currently form part of buildings or structures. In accordance with the provisions of the Asbestos Regulations, 2002 as promulgated under the Occupational Health and Safety Act, 1993 these products must be maintained as to prevent the release of asbestos fibres. Additional to the inventory kept, the Asbestos Regulations as promulgated under the OHS Act only requires that poorly maintained or asbestos containing material that may release high levels of asbestos fibres be removed. The legal requirements to be

complied with when demolishing or disposing asbestos will vary depending on the product involved and it may be advisable to phone a SafeNet consultant should you be unclear on the correct process to be followed.

The team at SafeNet

SafeNet (Africa) Tel: (021) 946 1261 Fax: (021) 946 1260
e-mail: admin@safenetafrica.co.za
Website: <http://www.safenetafrica.co.za>

FEEDBACK ON GCC EXAMINATIONS

Over the years there has always been comment about the low pass rate of persons writing the GCC. To illustrate the low pass rate, we will note the last 3 years results below.

FACTORIES	CANDIDATES		PASS RATE %	
	Law	Plant	Law	Plant
Nov. 2007	183 (265)*	**	38	
June 2007	127 (193)	172 (260)	32	15
Nov 2006	199 (267)	227 (260)	31	13
June 2006	147 (221)	208 (300)	31	17
Nov 2005	177 (257)	205 (270)	20	12
June 2005	157 (216)	247 (310)	28	6
MINING				
Nov. 2007	**	**		
June 2007	114	164	22	21
Nov 2006	107	140	23	26
June 2006	115	147	24	13
Nov 2005	113	163	8	11
June 2005	116	143	30	9

* = number is of those who wrote the exam & in brackets is number of candidates who registered for exam,

** = Figures not available for inclusion.

Now we have been privileged to get some feedback from the examiners reports and the comments made by them as follows:

- In a lot of cases the questions were answered in too general terms without giving the requested facts except repeating the facts given in the question.
- Candidates tend to answer, "must comply with the OHSAct and Regulations" or "as prescribed by Regulations".
- Questions or part of questions are left out completely.
- A large number of candidates do not attempt to answer the questions on the definitions and thus losing needed marks. = 23% to illustrate:

J 05	N 05	J 06	N 06	J 07	N 07
24	21	25	23	26	24

- The candidates tend to answer on procedures and not the physical requirements.
- On the Facility Regulations candidates described how the facilities must be used instead of giving the requirements to which it must comply.
- Candidates have no idea how to deal with occupational diseases administratively.
- Candidates do not give details.
- On a question on power lines, candidates answered that a clearance of 30 m (7) is required to a 66kV power line.
- Candidates do not know the requirements for qualifications and the appointment of a competent person in terms of GMR 2.
- Candidates do not know how to deal with the responsibilities associated with an electrical installation.
- The effective open floor area for an employee is given as 100m²
- Diving Regulations were poorly answered as there were traditionally no questions on diving, although it is part of the exam requirements.
- A question on circular saws from the Driven Machinery Regulations was poorly answered (question pass rate – 31%).
- Environmental Regulations definitions: *Acclimatised* – When pollution has been absorbed in atmosphere and blend with climate. *Working plane* – average height of eye sight.
- A question on working in environment with WGBT index above 30°C was given as conditions below 0°C.
- Generally poor knowledge of:
 - Hazardous Chemical Substance Regs
 - Major Hazard Installation Regs
 - Hazardous Biochemical Agents Regs
 - Construction Regs
 - Lift, Escalator and Passenger Conveyor Regs
 - Driven Machinery Regulations – *National code of Practice for the evaluation of training providers for lifting machine operators*

Kindly note: The Board of Examiners is looking for 2 persons to serve as examiners for Plant Engineering (Factories). Any person interested to please contact the editor of this news bulletin.

OHSACT NOV. 97 (3) (a) (b)

- (a) State whether the following statements are true or false in respect of the Facilities Regulations.
- (i) Any employer can make written arrangements for his employees to use closets and wash basins on any adjoining premises.
Ans. False. FR 2(2) (a)(b)
- (ii) An employer of a factory shall provide disposable paper towels for use by employees at wash basins.
Ans. False. FR 2(3) (c)
- (iii) Water feeding showers or wash basins for use by employees must either comply with SABS 241 or must be obtained from a local authority.
Ans. True FR 2(5) (d)
- (iv) The employer at a factory must provide every employee with a personal facility for safe keeping of clothes and personal items.
Ans. True FR 3(1)
- (v) All employees at a work place who need to undress must be provided with change rooms.
Ans. True. FR 4(1)(a)(b)
- (vi) An employer may allow change rooms unconditionally to be used for the partaking of meals.
Ans. False FR 4(3)(a)(b)
- (vii) Adequate drinking water must be available for employees at a work place, and the employer must mark conspicuously taps and pipes containing water not fit for human consumption.
Ans. True FR 7(a)(b)
- (viii) The employer shall provide where reasonable practicable a seat for every employee at his work station whose work can be effectively performed while sitting.
Ans. True FR 8(a)
- (ix) All seats provided by the employer must be provided with back rests.
Ans. False FR 8(c)
- (x) An inspector may after he received a complaint, by notice in writing, direct an employer to take steps to improve the maintenance of the rooms referred to in the Facilities Regulations.
Ans. True FR 9
- (b) When stacks are built which consist of successive tiers one on top of the other they must comply with regulation requirements.
State the SIX requirements.
Ans. GSR 8(1)(a) to (f) and GSR 8(4)(b)

Jorge Pereira (Cert Eng)

COMMERCIAL MEMBER

Sappi Cape Kraft (PTY) Ltd Milnerton. Tel 021 552-2127

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**LAW AND PLANT COURSES
PHONE MAGGIE 011 463 3536**

PLANT ENG. NOV. 80 (6) (a)

Explain the difference between an impulse and reaction turbine. (6)

Steam turbines are classified as Impulse or Reaction types depending on how the steam expansion takes place.

Impulse Turbine:

In an Impulse turbine, all the available pressure drop from supply to exhaust occurs across the nozzles, which are arranged in the turbine casing. The steam carries out its full expansion in the nozzles and emerges with high velocity. The nozzle is directed so that the steam glides onto the blades, and these are so shaped that the direction of flow of steam is changed and thereby a force is exerted on to the blades.

Reaction Turbine:

In a Reaction turbine, only part of the pressure drop occurs in the nozzles, the remainder occurring during the passage of the steam through the blades. A ring of fixed blades acts as the nozzles for each stage. The blade passages are nozzle shaped so that the acceleration of the steam occurs partly in the nozzles, and partly in the blades. Since acceleration requires a force, a resultant reaction occurs in the blades. The force of reaction is added to the force resulting from re-direction of the steam to make the total propulsive force on the blades. Such a turbine would be better called an impulse-reaction type, since the propulsive force is due partly to each action.

PLANT ENG. NOV. 80 (6) (c)

60 000 kg/hr of steam is let down through one of two condensing turbines operating at 3,3 Mpa. and 360°C to a condenser pressure of 16 kPa.

Assume an isentropic efficiency of 80%

- (a) what would be the power developed by the condensing turbine?
- (b) And what would be the wetness at exhaust?

Answer:

From the **Steam chart** at 3300 kPa and 360°C we get, enthalpy, $h_1=3135$ kJ/kg and $S_1 = 6,73$ kJ/kgk, and at 16 kPa we get $h_2 = 2195$ kJ/kg and at this point we get a dryness fraction of **0,826**.

- (b) Dryness fraction = 0,826 from chart.

From **Steam tables** at 16 kPa we get, $h_f=232$ kJ/kg, $h_{fg}=2370$ kJ/kg, $S_f=0,772$ kJ/kg k and $S_g=7,987$ kJ/kg k.

- (a) Power developed by turbine:

$Power=60\ 000/3600 \times (3135 - 2195) = 15,7$ kW. But this power is the input power to the turbine, so the power developed by the turbine is $15,67 \times 0,8 = 12,53$ kW

But, we can also find the dryness fraction by using a formula:

$S_2 = S_f + (x_2 \cdot S_{fg2})$

And by using the values found above from the steam chart and steam tables:

$S_2 = 0,772 + (x_2 \cdot (7,987 - 0,772))$ and

$S_1 = S_2 = 6,73$ because it is an (isentropic expansion). Therefore we find **$x_2 = 0,826$** . (Same as above from chart)

Now, to find the Power of the turbine, we can find (h2) by using a formula,

$h_2 = h_f + x_2 h_{fg}$, instead of using the steam chart as it was done above.

$h_2=232 + (0,826 \times 2370)=2190$ kJ/kg. [With the steam chart (h2) was 2195 kJ/kg as seen above].

$Power = 60\ 000/3600 \times (3135 - 2190) \times 0,8 = 12,6$ kW.

Jorge Pereira (Cert Eng).

ELECTRICITY IN CAPE TOWN

SALT RIVER NO.1 POWER STATION (ESKOM)

This was the first thermal power station to be built and operated by Eskom, now officially known as Eskom.

First Stage (1928)

- 3 - Turbo-alternator sets.
Howden turbines.
English Electric, U.K.
10 000 kW, 12 000 V, 50 Hz, three-phase.
- 2 - Boilers.
Chain-grate, stoker-fired type.
Babcock and Wilcox.
60 000 pounds of steam per hour at 270 psig and 700°F (370°C).

Commissioned 1928
Station total installed generating capacity **30 000 kW**

This first stage, comprising the three 10 000 kW sets, generated electricity for the first time on 15 February 1928.

Second Stage (1933-1935)

- 3 - Turbo-alternator sets.
C A Parsons and Co., U.K.
20 000 kW, 33 000 V, 50 Hz, three-phase.

These latter units were the first turbo-alternator sets in South Africa to generate directly at 33 000 V.

- 6 - Boilers.
Chain-grate stoker-fired type.
Babcock and Wilcox.
100 000 pounds of steam per hour at 425 psig and 750°F (400°C).

Commissioned (final) 1935
Station total installed generating capacity **90 000 kW**

The three 20 000 kW sets of this second stage were progressively installed and commissioned over the period 1933 to 1935.

The station was decommissioned in 1979 after more than half a century of service.

TABLE BAY POWER STATION

First Stage (1936-1939)

- 3 - Turbo-alternator sets.
C A Parsons and Co., U.K.
12 000 V, 50 Hz, three-phase, 3 000 rpm.
40 000 kW CMR (continuous maximum rating).
(32 000 kW economic rating).
(50 000 kW overload rating).

These turbo-alternators were later uprated from 40 000 kW to 45 000 kW units by replacing the original 34-inch diameter rotor units with 36-inch rotor sets, one in 1956 and the other two in 1959.

- 6 - Boilers.
Chain-grate, stoker-fired, water-tube type.
Babcock and Wilcox.
230 000 pounds of steam per hour at 625 psig and 825°F (440°C).

Station total installed generating capacity **120 000 kW**

This station was the first in South Africa to operate at a steam pressure higher than 425 psig.

Second Stage (1949)

- 1 - Turbo-alternator set.
C A Parsons and Co., U.K.
12 000 V, 50 Hz, three-phase, 3 000 rpm.
42 000 kW CMR (continuous maximum rating).
- 2 - Boilers.
Chain-grate, stoker-fired, water-tube type.
Babcock and Wilcox.
230 000 pounds of steam per hour at 625 psig and 825°F (440°C).

Station total installed generating capacity **162 000 kW**

Third Stage (1952)

- 1 - Turbo-alternator set.
C A Parsons and Co., U.K.
12 000 V, 50 Hz, three-phase, 3 000 rpm.
42 000 kW CMR (continuous maximum rating).
- 1 - Boiler.
Chain-grate, stoker-fired, water-tube type.
Babcock and Wilcox.
230 000 pounds of steam per hour at 625 psig and 825°F (440°C).

Station total installed generating capacity **204 000 kW**

The station went into full commercial operation with all five sets on 1 February 1953.

Fourth Stage (1957)

- 1 - Boiler.
Chain-grate, stoker-fired, water-tube type.
Babcock and Wilcox.
230 000 pounds of steam per hour at 625 psig and 825°F (440°C).

At the end of 1959, after the uprating of the first three turbo-alternators from 40 MW to 45 MW sets, and along with the last two 42 MW units, the total rating of the station was at its ultimate installed capacity of 219 MW.

Station total installed generating capacity **219 000 kW**

The station was decommissioned in 1983 and demolished over a three-year period from 1986 to 1989.

SALT RIVER NO.2 POWER STATION (ESKOM)

- 4 - Turbo-alternator sets.
Metropolitan Vickers, U.K.
12 000 V, 50 Hz, three-phase.
30 000 kW.
- 6 - Boilers.
Chain-grate stoker-fired type.
Babcock and Wilcox.
260 000 pounds of steam per hour at 635 psig and 915°F (490°C).

Station total installed generating capacity **120 000 kW**

The steam temperature of 915°F was the highest of any power station in South Africa at the time.

The first set in this station commenced generation in April 1955.

Second Stage (1967)

- 2 - Turbo-alternator sets.
Hydrogen cooled.
Escher Wyss-Oerlikon, Switzerland.
12 000 V, 50 Hz, three-phase, 3 000 rpm.
60 000 kW (CMR).
- 4 - Boilers.
Chain-grate stoker-fired type.
Babcock and Wilcox.
260 000 pounds of steam per hour at 635 psig and 915°F (490°C).

Station total installed generating capacity **240 000 kW**

The station was decommissioned on 29 July 1994.