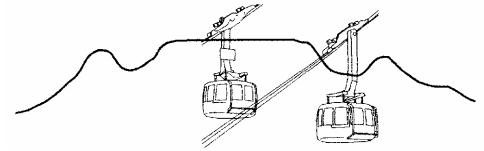




WCB ENGINEERING BULLETIN

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

P O Box 504, Rondebosch, 7700



OCTOBER 2007

- 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.

In the Institution's endeavour to serve you, our member and Certificated Engineer, we are constantly in need of persons to participate in the various meetings, workshops and or surveys. In recent years the number of individuals who have made themselves available to serve on Council has dwindled to a paltry few. This has resulted in the work load being borne essentially by 2 or 3 people. Our Council meeting attendance has also declined and then the activities from the branches have waned resulting in greater pressure on those willing souls attending to our future career paths. This is most concerning as, if the Certificated Engineer does not stand up and have his say or participate in matters of concern to CE's, then we will have to accept whatever other people dish up for us. Believe me that this is real. There are parties out there who for some reason have no respect for the Certificated Engineer and are trying their level best to undermine our future! If we do not stand up and be heard (by participating in the various forums), we will lose the constant battle.

I need to appeal to anyone who is in any way able and willing to assist in the processes to come forward and make your presence felt. We really need you. Especially those of you who are in the Gauteng area. The meetings take place at ECSA at Bruma, and rarely more than twice a month, but with fewer people participating this requirement increases and thus the load increases.

In this bulletin we have the normal GCC examination questions and answers.

A further extract from the Appendix of a book compiled by one of the former City of Cape Town Electrical Engineers, Mr. Dennis Palser.

We would welcome any contributions or letters from our readers to include in the bulletin so that we could start debates on any subject that you may have an interest in. Also, should one of you out there have a question the answer to which tickles you, please share it with us so that we can make use of the combined minds of our membership to find the answer! We look forward to hearing from you.

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

Chris Schnehage

Tel: 083 326 8023 Email: icmeewc@netactive.co.za
Editor: Henriette Venter email: vencon@netactive.co.za

LOCAL BRANCH NEWS

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

On 21 August Enrico Anelli presented a very interesting talk on the SCUBA diving and related safety procedures and regulations. Unfortunately there were only 7 members who could find the time to attend.

On 27 September member Christopher Stolle presented a most interesting talk on "an Overview of the Seismic Design Base for Koeberg Nuclear Power Station" attended by 9 members.

The next few months events planned are:

- October 2007 – Talk on VSD's and their effect on power installations
November – visit to ship RMS St Helena when in the harbour

We look forward to seeing you at one of our functions.
Ciao for now!

Chris Schnehage

Tel: 083 326 8023
Email: icmeewc@netactive.co.za

ELECTRICITY IN CAPE TOWN

Part 2 of the extract from a document titled "A Historical Record commemorating the Centenary of the City of Cape Town Electricity Undertaking 1895 to 1995" by Denis Palser.

DORP STREET POWER STATION

- 1 - Steam engine-dynamo set.
Engine, reciprocating type.
Double-crank, single-acting, high-speed, compound type.
Bumpsted and Chandler.
200 HP.
Dynamo, direct-coupled.
Two-pole, high-speed type.
Crompton.
150 kW.
- 2 - Steam balancer sets.
50 HP.
- 2 - Locomotive type boilers.
Clayton and Shuttleworth, Hyde, UK.
Commissioned 1898
Total installed engine capacity 300 HP
Total installed generating capacity (about) 225 kW

The 200 HP engine and 150 kW dynamo set was moved to the new Dock Road power station early in 1904, "after the Christmas load". On 17 February 1904, the 50 HP sets were shut down and disposed of soon afterwards.

DOCK ROAD (Temporary Wood and Iron Shed)

- 2 - Steam engine-generator sets.
Engines, reciprocating type.
Vertical, high-speed, tandem compound, enclosed type.
Sisson and Company, Gloucester, UK.
500 BHP.
Generators, direct-coupled.
Double current type.
Johnson and Phillips, London.
350 kW.

- 4 - Boilers.
Coal-fired, dry-backed, return-tube type.
Davey, Paxman and Co., UK.
Latest "Economic" type.
7 500 pounds of steam per hour at 150 psig and 212°F (100°C).

These four boilers were later moved to the new power station in Dock Road.

Commissioned	1900
Total installed engine capacity	1 000 HP
Total installed generating capacity	700 kW

A few years later the capacity of this temporary station was increased by the addition of a further steam engine-dynamo set, as below.

- 1 - Steam engine-dynamo set.
Engine, reciprocating type.
Three-crank, triple-expansion type.
Bellis and Morcom.
450 HP.
Dynamo, direct-coupled.
Six-pole type.
Mather and Platt.
300 kW.

Commissioned	1903
--------------	------

This latter unit was later removed from the temporary shed and installed in the new permanent Dock Road power station early in 1904.

Station total installed engine capacity	1 450 HP
Station total installed generating capacity	1 000 kW

THE CENTRAL ELECTRIC LIGHT STATION

First Stage (1904)

- 1 - Steam engine-dynamo set.
Engine, reciprocating type.
Two-crank, single-acting, high-speed, compound type

Bumpsted and Chandler.
200 HP.
Dynamo, direct-coupled.
Two-pole type.
Crompton.
150 kW.

The above set was moved here from Dorp Street.

- 1 - Steam engine-dynamo set.
Engine, reciprocating type.
Three-crank, triple-expansion type.
Bellis and Morcom.
450 HP.
Dynamo, direct-coupled.
Six-pole type.
Mather and Platt.
300 kW.

The above set was moved here from the temporary shed in Dock Road.

- 2 - Steam engines-dynamo sets.
Engines, reciprocating type.
Cross-compound type.
Ferranti Ltd.
1 000 HP.
Dynamos, direct-coupled.
Ten-pole type.
English Electric Manufacturing Company, UK.

Dick Kerr and Company.
700 kW.

- 4 - Boilers.
Hand-fired, dry-backed, return-tube type.
Davey Paxman and Co., UK.
Latest "Economic" type.
7 500 pounds of steam per hour at 150 psig.

These boilers were moved here from the temporary shed in Dock Road.

- 2 - Boilers.
Water-tube type, with economisers and superheaters.
20 000 pounds of steam per hour at 160 psig.

Eventually all the land-based boilers were replaced over a period by eight Babcock and Wilcox marine-type boilers with a total rated output of 239 000 pounds of steam per hour at a pressure of 220 psig.

Station total installed engine capacity	2 650 HP
---	----------

Station total installed generating capacity	1 850 kW
---	-----------------

The station was formally opened by the Mayor, Mr W Thorne, on 14 April 1904.

Extension No.1 (1909)

- 2 - Steam engine-alternator sets.
Engines, reciprocating type.
Bellis-Siemens.
400 kW (525 HP), 2 200 V, two-phase.

These sets were installed primarily to meet the alternating current requirements of the Railway and Harbour Departments. They were apparently three-phase sets but wound specially for two-phase operation, evidently to permit supply to the government single-phase systems that had just been taken over.

With the installation of these two sets alternating current generation was introduced to the City for the first time.

Station total installed engine capacity	3 700 HP
---	----------

Station total installed generating capacity	2 650 kW
---	-----------------

The four Davey Paxman hand-fired boilers were removed and replaced with new Babcock and Wilcox chain-grate stoker-fired boilers of the same pressure, along with a single tall brick chimney stack in 1908.

(To be continued).

COMMERCIAL MEMBER

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

Jorge Pereira, part time lecturer at College of Cape Town on the subject Plant Engineering for the GCC examinations, is offering his complete set of Questions and Answers and notes for sale to interested parties.

Anyone interested, please to contact
Jorge direct at 082 896 8489

Do you need the services of a Certificated Engineer to mentor to be your next Plant Engineer?

Contact Chris @ 073 280 0821

2. A 3-kg object is released from rest at a height of 5m on a curved frictionless ramp. At the foot of the ramp is a spring of force constant $k = 100 \text{ N/m}$. The object slides down the ramp and into the spring, compressing it a distance x before coming to rest.

10 (a) Find x .
5 (b) Does the object continue to move after it comes to rest? If yes, how high will it go up the slope before it comes to rest?

PLANT ENG. JUNE 2000 (1) (c)

The following observations are made on a boiler and steam engine plant:

Atmospheric pressure	95 kPa
Boiler gauge pressure	700 kPa
Hot well temperature	50° C
Temperature of boiler house	28° C
Moisture in fuel per mass	2%
Mass of flue gases/kg fuel	17,8 kg
Coal used per hour	60,2 kg
LCV of coal	21,3 MJ/kg
Temperature of flue gases	325° C
Brake power of steam engine	39 kW
Mean SHC of flue gases	0,25 KJ/kg
Condition of steam	0,95 dry

Draw up a heat balance and find:

- (a) the overall efficiency of the boiler
(b) the overall efficiency of the plant (10)

Absolute pressure = 795 kPa
Using Steam Tables and interpolate for 795 Kpa we get the following values:
 $t^{\circ}\text{C} = 170,15^{\circ}\text{C}$
 $hf = 720 \text{ KJ/kg}$ and $hfg = 2047,75 \text{ KJ/kg}$

To do a heat balance sheet:

Heat = $ms/mf \times (h)$ enthalpy
And: $mf = 60,2 \times 0,98 = 59 \text{ kg}$
Therefore: $ms/mf = 6,78$

Heat to Economiser :

$h = 4,187 \times (170,5^{\circ} - 50^{\circ}) = 503 \text{ KJ/kg}$
heat = $6,78 \times 503 = 3411 \text{ KJ/kg}$

Heat to Boiler:

$h = 0,95 \times 2047,75 = 1945,36 \text{ KJ/kg}$
heat = $6,78 \times 1945,36 = 13189 \text{ KJ/kg}$

Heat to flue gases:

heat = $17,8 \times 0,25 \times (325^{\circ} - 28^{\circ}) =$
 $= 1322 \text{ KJ/kg}$

Heat unaccounted for is = heat in – heat out

$21300 - 3411 - 13189 - 1322 = 3379 \text{ KJ/kg}$

To find the % heat in each component:

Economiser:	$3411/21300 \times 100 = 16,01\%$
Boiler:	61,92%
Flue-gases:	6,207%
Radiation:	15,864%
Total =	100%

- (i) To find the efficiency of the boiler:

$$\eta_{\text{boiler}} = \frac{ms \times \Delta h}{mf \times CV_{\text{fuel}}} \times 100$$

$$\Delta h = (hf + qx hfg) - 4,187 \times 50^{\circ}$$

$$\Delta h = (720 + 0,95 \times 2047,75) - 209,35 =$$

$$= 2456 \text{ KJ / kg}$$

We can find (Δh) by making use of the steam chart as follows :

From the steam chart at a pressure of 795 kPa and $q = 0,95$ we get :

$$h_{\text{total}} = \pm 2665 \text{ kJ / kg}$$

$$\therefore \Delta h = 2665 - 209,35 = 2456 \text{ kJ / kg}$$

$$\eta_{\text{boiler}} = \frac{400 \times 2456}{59 \times 21300} \times 100 = 78,17\%$$

- (ii) to find the plant efficiency :

$$\eta_{\text{plant}} = \frac{39}{\frac{59}{3600} \times 21300} \times 100 = 11,17\%$$

Jorge Pereira (Cert Eng)

OHSA Nov. 98 (2) (a) & (b)

Nov. 98 (2) (a):

Indicate whether the following statements are TRUE or FALSE in respect of the asbestos regulations:

- (i) Every employer shall allow an authorized inspection authority to peruse the exposure record with respect to a particular employee upon the written request of such an employee.
Ans. False. AR 8 (b)
- (ii) Every employer shall keep a copy of the exposure record of an employee available for inspection by an employee representative.
Ans. False. AR 8 (c)
- (iii) Every employer shall take steps to ensure that any workplace under his control is zoned as an asbestos area where there is a concentration of asbestos dust.
Ans. False. AR 9 (1) (a)
- (iv) Every employer shall take steps to ensure that any workplace is zoned as a respirator zone where the concentration of asbestos dust exceeds the action level for asbestos.
Ans. False. AR 9 (1) (b)
- (v) Protective clothing suitable for asbestos need only be worn in respirator zoned areas.
Ans. False. AR 9 (2) (b)
- (vi) An employer need not control the exposure of persons to asbestos dust if the exposure at the working environment is within the exposure limit.
Ans. False. AR 2
- (vii) An employer where the work processes give rise to asbestos dust need only lay down appropriate work practices where the exposure to asbestos dust exceeds the exposure limit.
Ans. True. AR 10
- (viii) An employer who processes asbestos need only take steps to ensure all work places are maintained in a clean state and are free of asbestos waste where the asbestos concentration is above the action level of asbestos.
Ans. False. AR 11

- (ix) The application of asbestos by means of spraying processes is prohibited.
Ans. True. AR 13
- (x) A person who processes asbestos in raw material form or who processes materials containing asbestos must notify the Divisional Inspector / Provincial Director in writing prior to commencement of such process.
Ans. True. AR 3

Nov. 98 (2) (b):

In terms of noise and hearing conservation regulations state:

- (i) The workplaces where the hearing conservation regulation shall apply.
Ans. ERW 7 (1)
- (ii) The exclusion mentioned in the regulation where the demarcation of noise zones with a noise level above the equivalent noise level, which can not be reduced, shall not apply and give the proviso thereto.
Ans. ERW 7 (5)
- (iii) Two requirements imposed on the employer where the equivalent noise levels at a workplace cannot be reduced to below the equivalent noise level.
Ans. ERW 7 (3)
- (iv) Three regulatory requirements to which the issuing of hearing protectors by employers, must comply.
Ans. ERW 7 (8)
- (v) The regulation requirements when an employer wants to determine noise zones.
Ans. ERW 7 (11)

Jorge Pereira (Cert. Eng.)

**VEASEYS ENGINEERING COLLEGE
STUDY FOR THE G.C.C. WITH US.**



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

SafeNet Thought for the Day



7 SEPTEMBER 2007

OHSAS 18001: 2007 — NOW A STANDARD

As most of you know by now, OHSAS 18001 has been around since 1999 and already many companies have started or is in the process of implementing this health and safety management system.

What is interesting is that the current series has now been amended and as from July 2007 this new amended version will be applicable.

The principle changes with respect to the previous edition are as follows:

1. The importance of "health" has now been given greater emphasis;
2. OHSAS 18001 now refers to itself as a standard, not a specification, or document, as in the earlier edition-;
3. New definitions have been added,
4. Significant improvement in alignment with ISO 14001: 2004 throughout the standard, and improvement compatibility with ISO 9001: 2000-
5. The term "tolerable" risk has been replaced by the term "acceptable" risk;
6. The term "accident" is now included in the term "incident";

7. The definition of the term "hazard" no longer refers to "damage to property or damage to the workplace environment";
8. A new requirement has been introduced for the consideration of the hierarchy of controls as part of CH&S planning;
9. Management of change is now more explicitly addressed,
10. A new clause on the "Evaluation of compliance" has been introduced;
11. New requirements have been introduced for participation and consultation; and
12. New requirements have been introduced for the investigation of incidents.

The standard is available at the South African Bureau of Standards.

14 SEPTEMBER 2007

EMPLOYER FOUND GUILTY FOR CONTRAVENING OHS ACT

It is not often that you hear or read in the newspapers that an employer was prosecuted by the Department of Labour. This is probable due to the fact that people normally don't brag about being held liable for their inability to perform their duties. Nothing however stops the Department of Labour from bragging about their achievements as is clear from the media statements recently issued by the Department of Labour. It would appear as if the Department of Labour has learned from their counter parts in Europe who go to great lengths to name and shame companies or individuals who contravenes health and safety legislation.

The following media statement was recently issued by the Department of Labour.

"Employer fined R50 000 or imprisonment for risking worker's life"

Labour Minister Membathisi Mdladlana, has welcomed the Odendaalsrus Magistrate Court ruling, against an employer who violated the Occupational Health and Safety Act and Regulations (OHS).

In a major breakthrough in occupational health and safety related incidents, an employer of the Zenco Engineering Company in Odendaalsrus, outside Welkom in the Free State, was last week found guilty and sentenced to pay a fine of R 50 000 or 12 months imprisonment for exposing his workers to unsafe working conditions.

The Court had found that Willem Vosloo, the employer of the Zenco Engineering Company contravened the OHS Act, after Jonas Ramotsehoa, a welder employed by the company, was strangled to death by a drilling machine while trying to clean it in 2004.

The Department of Labour instituted a formal investigation into the incident and a recommendation for a possible prosecution was referred to the National Public Prosecutions Authority. The Labour Inspector's findings during the formal investigation revealed that a lack of training, supervision and proper work procedures of operating machinery were the main cause of the fatal accident. The Court found that Vosloo failed to conduct a risk assessment to establish hazards to health and safety and did not apply any precautionary measures for his workers when operating machinery as required by the General Machinery Regulations."

Courtesy of:

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