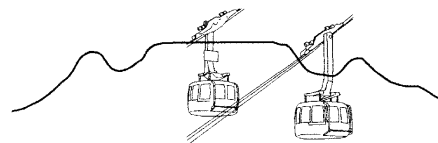




WCB ENGINEERING BULLETIN

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

P O Box 504, Rondebosch, 7700



JUNE 2009

- 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.

It is hard to believe that we are already at midyear!

This quarter we have our normal articles in this news bulletin. GCC exam questions and answers and Part 4 of the article on the Electrification of Cape Town, titled "Lighting up the Fairest Cape 1895 to 1995".

There is also an article produced by SafeNet titled "**New Electrical Installation Regulations, 2009**". The facts of these regulations being promulgated are important to everyone who owns a house or works in industry. Remember to ensure that the electricians (and especially contractors) providing CoC's are doing so in accordance with the new Regulations.

Should anyone require an electronic copy of the Regulations, please let me know. Otherwise you can obtain a paper copy from the Government printer.

Has anyone by any chance got any ideas as to how we can keep in touch with the changing Acts and Regulations affecting our areas of responsibilities? It is rather a tough time to stay abreast of changes and amendments as they happen often and some sneak through! I understand that it can be a nightmare for someone teaching the Act and Regulations to future Certificated Engineers to keep up with all the changes! Suggestions for a cost effective way would be appreciated. Please send your thoughts to me – I would greatly appreciate your input.

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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LOCAL BRANCH NEWS

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

Things have been a bit slow the last few months as presentations and visits that were being arranged did not take place due to various reasons.

However, one talk did take place on 21 April and that was on "The route to energy efficiency – a practical approach". 9 members attended the meeting. Well done to all of you!!

The following are items that are being planned for presentation:
June 30 – talk on "the current trends in solar energy options, the benefits and technical options plus examples of some of the applications (large scale down to domestic) that are being implemented in SA and abroad".

July - presentation on infrared testing of critical electrical machinery.

August – a visit to a company in Strand – GrahamTech. Still to be arranged.

September – we hope to present a talk on pump selection and solutions.

Hopefully one of these days some of you will attend our meetings or offerings.

Should any of our members receive this news letter by mail and would like to get it electronically – or you notice that you are not getting invitations to our talks and visits, please be so kind as to forward your email address to me the email address below.

Ciao for now!

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SAFENET THOUGHT FOR THE DAY

20 March 2009

New Electrical Installation Regulations, 2009

On the 6th of March 2009 the Department of Labour promulgated new Electrical Installation Regulations in Government Gazette Notice Number 31975. These regulations replace the Electrical Installation Regulations promulgated on the 23rd of October 1992. Except for one provision which we will later cover in this Safety Thought all other regulations as per this gazette will come into effect on the 1st of May 2009.

The existing provision which requires that a valid Certificate of Compliance (COC) be obtained for each premises remains unchanged. A Certificate of Compliance must also still be obtained for all additions or alterations made to existing installations.

Here are some of the important requirements as per the regulations promulgated:

1. The format of the Certificate of Compliance has been changed. The new certificate is more a declaration in that the electrical contractor is required to state that the work has been done in accordance with the legal requirements and therefore safe for use. The COC contains no information on the measurement results obtained during the inspection conducted by the electrical contractor and for this reason the contractor is required to add to the COC a test report which must be in the format as prescribed by the Department of Labour.

A major problem with the COC's currently issued by some contractors is the fact that some sections of the document are not completed or are not completed properly. It is not uncommon to find that the electrical contractor failed to provide his contact detail or detail about his company. This makes it nearly impossible for the client to later contact the electrical contractor. The new

certificate now clearly states that the certificate will only be valid should:

- a. All sections of the COC be properly completed. The electrical contractor will for instance be required to provide all his contact details including cell number and e-mail address;
 - b. The additional test report be attached; and
 - c. No corrections have been made on the certificate.
2. All certificates issued by electrical contractors must contain a unique number and must have been issued by the Department of Labour (DoL) or a person appointed by them for this purpose. This will in all probability mean that electrical contractors will have to buy these certificates from the DOL. As all certificates are numbered the DOL would be able to trace all certificates back to the electrical contractor to whom these certificates were issued. This will in all probability limit the number of certificates issued by unauthorized persons as the certificates could be traced back to the contractor who these certificates were issued to;
3. The safety of the electrical installation remains the responsibility of the user or lessor of the installation. The regulations do however allow for the lessor or user to transfer this responsibility to the lessee should the two parties have agreed to this in writing. I assume this will become a standard clause in all leasing contracts;
4. The regulations make provision for the establishment and registration of Approved Inspection Authorities (AIA) for electrical installations. These AIA's will not be your normal electrical contractor as the regulations prohibit them from operating as electrical contractors. These AIA's could be contracted by the DoL or users of electrical installation to investigate electrical complaints. The reports submitted by the AIA will enable the DoL or the client to put some pressure on the electrical contractor to fix non-conformances;
5. Registered Electrical Contractors are now required to exercise general control over all electrical work done by his employees. General control is defined as *"In relation to electrical installation work that is being carried out, includes instructions, guidance and supervision in respect of that work"*. The term supervision could be open for debate, but it is my opinion that the DoL would require that competent registered persons be present or readily available when electrical work is being done;
6. The most important new requirements are the following:
- a. The design of all electrical installation in excess of 1 kV must be approved by a person who is in possession of the following qualifications:
 - i. An engineering diploma in the mechanical or electrotechnical (heavy current) qualification of at least a T3 or N5 level;
 - ii. A graduate engineer who has passed the Government Ticket examination on the Occupational Health and Safety Act, 1993;
 - iii. A certificated engineer; or
 - iv. A person registered in a professional category in terms of the Engineering Profession Act, 2000;
 - b. Where the new installation will supply five or more users the whole project from commencement to commissioning must be supervised by either an AIA or a person who holds the technical qualifications as mentioned above. This legal requirement comes into effect on the 1st of April 2010;
7. All electrical contractors are required to register annually with the DoL. The names of all electrical contractors will be placed on a national database and it is clear from the regulations pertaining to the registration of electrical contractors that the DoL wants to exercise better control over registered electrical contractors. The DoL could for instance revoke the registration of an AIA or electrical contractor should they:

- a. Fail to register as per above mentioned legal requirement; and / or
 - b. Be charged and convicted of any offence in terms of these regulations;
8. The days where any person could do electrical work and then obtain the services of a registered person to issue the COC is something of the past as the regulations require that electrical contractors must as the minimum employ one registered person in a full time capacity; and
9. Important to note is the fact that in the past the responsibility to obtain the COC was mainly that of the user (Person who contracted the services of the electrical contractor). The new regulations now clearly state that the electrical contractor **shall** ensure that the COC is issued for all work done.

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OHSAct Exam Paper

Refer to the March 09 Bulletin

The answers that I gave for the OHSAct exam paper of June 07 (1.2.1) (1.2.2) and (2.1) are wrong. I apologise. Here are the revised answers:

(1.2.1) See Government Notice No. R859 published by the Chief Inspector mentioned in part (1.2) of the question and not in Section 7 (1)(b) as stated.

(1.2.2) See the guidelines OHSAS 18001 and 18002 given in the above Government Notice. Section 7(2) states that Chief Inspector gives such guidelines. The question asks for "what guidelines".

(2.1) See Section 22 which deals with the requirements for the sale of the machinery and components. EMR 8(2) deals with the installation/position of the machinery and components.

 Jorge Pereira (Cert Eng)

PLANT ENG. June. 09 (1) Compulsory

- 1.1 A statutory inspection needs to be carried out on a three pass economic type welded horizontal boiler. Name 20 items to be checked. (10)
- 1.2 A boiler needs to be replaced with a 3 000 kW boiler that operates at 1 000 kPa. The feed water temperature is 50° C. Determine if this boiler will be capable to deliver at least 4 000 kg/h that is needed for the plant at peak period. From steam tables:
 Feedwater hf = 4,19 kJ/kg °C
 Steam hg = 2 782 kJ/kg (6)
- 1.3 A process requires 5 000 kg/h of dry saturated steam at 700 kPa. For the flow velocity not to exceed 25 m/s, determine the pipe size.
 From steam tables, the specific volume at 700 kPa (Vg) = 0,24 m³/kg. (4)

1.1 Answer:

- 1. Identify boiler as on copper plate or data plate and its plate and its Registration Certificate. Note its AWGP.
- 2. Use low-voltage (max. 50 W) hand lamps and/or torches. Burners or coal grates to be removed. Make boiler fully accessible (internal and external) and ventilated.

External:

3. Inspect shell for rust and wastage. Remove cladding where corrosion is suspected. Inspect all welded seams and flanges.
4. Inspect circumferential and longitudinal seams of flue. Check roundness of flue and front and rear welded seams and general wastage.
5. Check front and rear tube plates, tube expansions and note signs of leakage. Check all ligaments for cracks.
6. Inspect inner tube plate and tube expansions. Look for cracks in welding where tubes are welded into the tube plate. Check for cracks in the ligaments.
7. While in the combustion chamber check plating for distortion and the welding of the stay bar ends. Look for blockages in the stay bar holes in the ends of the stay bars.
8. Inspect all tubes for straightness and possible blockages. Also any deposits are removed.
9. Check all tube plates with a straight edge for possible deformation (bulching).

Internal:

10. Check scale or corrosion on tubes and tube plates. Collect samples of scale (loose or attached) for analysis.
11. Check securing of steam/water separator box.
12. Check for blocked holes in the internal feed maker pipe and its securing.

Appurtenances:

13. All valves and other fittings must be overhauled and opened up for inspection. Pressure gauges to be checked and verified.
14. Examine all mountings, studs and bolts for soundness.
15. Blowdown cock, line and pit to be examined as one entity. Pit cover bolted on with 2 m standpipe. Ensure line is free and above any water in trench.

Controls:

16. Check that electrical controls are fitted in water proof and locked box.
17. Control panel and indicators to be in compliance.
18. Wiring put in metal tubing and secured at both ends.
19. Drive belts for fans (FD and ID) to be checked for cracks or wear.
20. Feed pump (s) performance to be monitored by user and entered in log book.

General:

21. Request user to have stay wires of chimney stack examined and recorded in log book.
22. Request user to repair roof and/or take steps where rain water runs down the chimney onto the boiler.

The above answer for (Q1.1) above, was kindly supplied by Adriaan Wijntje former boiler inspector and current member of this Institute.

1.2 (Answer):

From water and steam, temperature/enthalpy diagram we find:
 $\Delta h = 2782 - (4,19 \times 50) = 2572,5 \text{ kJ/kg}$

$$m_s = \frac{3000 \times 3600}{2572,5} = 4198,25 \text{ kg / h}$$

Which is about 200 kg/h of steam more than what the old boiler could deliver.

Therefore this boiler can be used.

1.4 (Answer):

From:

$$\text{Area of flow} = \frac{\text{mass / sec}}{\text{density} \times \text{velocity}}$$

$$\therefore \text{Pipe dia.} = \sqrt{\frac{5000 \times 0,24 \times 4}{3600 \times 25 \times \pi}} = 130,3 \text{ mm}$$

Jorge Pereira (Cert Eng)

ELECTRICITY IN CAPE TOWN

**Part 4
Claremont Power Station**

But by about the turn of the century it had become clear that the operation of these three small generating stations was no longer an economic proposition and it was accordingly resolved to replace them with a single larger power station located nearer the distribution load centre. To this end the Cape Peninsula Lighting Company built and commissioned a new power station in 1903, known most appropriately as the Central Power Station. It was strategically situated just off the Main Road in Stegman Road, Claremont, on the mountain side of the railway line. The generating plant included both 440/220 V direct current and 3 300 V 60 Hz three-phase alternating current machines, with a combined installed capacity of 455 kW. The two tall chimneys of the power station towered above the surrounding buildings in the village, constituting a prominent landmark of the day.

The Mowbray, Rondebosch and Claremont areas, the latter also embracing the Newlands area, were supplied directly from this new power station by means of the 440/220 V direct current system, while the 3 300 V alternating current system was used to supply Wynberg, where it was converted to a 440/220 V direct current system. The Cape Peninsula Lighting Company was now effectively supplying all consumers right the way through from Observatory to Diep River at 440/220 V direct current on a three-wire system, with lighting supplies at 220 V and motive power at 440 V. In those early days, though, the use of electricity in the suburbs was confined largely to lighting, its application to motive power and other industrial applications being almost unheard of at the time.

With the commissioning of this new and larger power station at Claremont in 1903, the old generating plants at Wynberg and Rondebosch were shut down, the Mowbray plant apparently having been shut down a few years earlier.

During the latter part of 1911 the Council entered into negotiations with the Cape Peninsula Lighting Company for the acquisition of all its plant and assets, including its concessions to supply consumers in the southern suburbs. These negotiations were prompted by the lapse of the Company's concession in Wynberg and the expiration of its street lighting contracts with Rondebosch and Claremont in September 1912.

Following protracted negotiations with both the Company and the municipalities of Mowbray, Rondebosch and Claremont, which continued into the early part of 1912, the plant and the concessions of the Company were eventually acquired by the Council with effect from 1 January 1912. At the same time satisfactory street lighting contracts were also concluded with Rondebosch and Claremont, and a continuation of the Company's rights to supply consumers in Mowbray, Rondebosch and Claremont, were arranged. The streets in Mowbray at this time were apparently still lit by gas, with electric street lighting only being installed for the first time in 1922.

The generating plant in the Claremont power station continued to supply the southern suburban areas until 1913 when it too was shut down.

Although it was perhaps not fully appreciated in the early 1900s, the days of individual small municipalities generating electricity for their own isolated communities were numbered.

Muizenberg Power Station

The last municipality in the Cape Peninsula to embark upon a scheme of its own was that of Kalk Bay. In 1907 the municipality of Kalk Bay, which included the Muizenberg area, resolved to install an "electric light and power scheme" to supply not only the local residents, but also a proposed new sewage pumping station. To this end a 300 kW power station was built near the beach at Muizenberg, with sewage pumping plant installed in portion of the building. Although this power station was initially referred to as the Kalk Bay power station, in later years it was more generally known as the Muizenberg power station because of its location.

The site chosen was some distance from the residential area and from a study of an old photograph of the power station showing the Constantiaberg and Steenberg mountain ranges in the background and a site inspection, it is clear that it was located near the corner of what is today Prince George Drive and Royal Road, opposite Sunrise Beach. The precise location was about a hundred metres or so to the east of the old 33 kV Muizenberg main substation that was subsequently established in 1948 in what was then Margate Road, now Prince George Drive, and directly to the east of and adjacent to an existing sewage pumping station. Although the building was eventually demolished around 1935, its general outline is still visible to this day through the undergrowth, the area being strewn with old concrete and brickwork rubble.

The generating plant consisted of two 150 kW alternators, each driven by a reciprocating steam engine. The 3 300 V output of the alternators was stepped-down to a distribution voltage of 380/220 V to supply the residents of Muizenberg and Kalk Bay. This distribution voltage of 380/220 V at a frequency of 50 Hz, incidentally, was destined soon to become a national alternating current standard.

The power station was officially opened on 3 August 1907, with about a hundred ratepayers and guests in attendance. Within a few months the scheme was being lauded as "an unqualified success", bearing comparison "with any town in the Colony". It was also proudly claimed that the energy charge of 1s.0d. per unit was "moderate", and that the municipality looked forward "with confidence to deriving considerable revenue from this source in the future".

Initially the plant ran for only seven hours a day, but in 1910 operation was increased to thirteen hours daily and in 1913 the demand was such that the station operated continuously, having recently secured the contract to supply the municipality of Wynberg. This year also saw the incorporation of Kalk Bay into the City of Cape Town, and with it consideration was given to supplying Muizenberg and Kalk Bay from the City's new Dock Road power station. Because of the intervention of the First World War, though, this was not possible until 1918, when the two systems were finally interconnected, thereby permitting the Muizenberg power station to be shut down completely except during the hours from six in the evening to midnight. By 1920 the plant was being used for only a few hours a day to relieve peak loads on the 11 kV transmission line between Wynberg and Muizenberg.

The generating plant continued to supply the area in this progressively diminishing role until 17 February 1923, when it was finally shut down following the recent completion of a local substation in a more central location and supplied from the Dock Road power station by means of two 11 kV underground cables from the Claremont substation. The site of this new central substation was apparently in Atlantic Road, Muizenberg. The

original building still stands today, although a further floor was subsequently added and other alterations made over the years. Today the building serves as the electricity undertaking's Muizenberg district depot.

After the shut down of the power station plant in 1923, and the sale of the boilers in 1925 and the generating plant the following year, the building was not demolished immediately but continued to function as a distribution substation and a sewage pumping station until 1935, when the sewage pumps were removed to a new sewage pumping station, probably the same site as the present pumping station which adjoins the old power station site on one side and the old Muizenberg 33 kV main substation on the other. Soon afterwards the old power station building was demolished.

Incidentally, the power station in Muizenberg was built by a firm of building contractors under the supervision of a young carpenter, George Swingler, whose ability and competence so impressed the Mayor that he was also employed on the installation of the sewage pumping plant. Despite an initial degree of resentment in certain quarters because of his lack of any formal engineering qualifications, Swingler was appointed foreman in charge of the Muizenberg power station on its completion, an appointment that was destined to be the start of an illustrious career culminating in his eventual appointment as City Electrical Engineer of Cape Town in 1918.

But in 1907 a most significant event was looming on the horizon that would have far reaching consequences, namely the unification of all the independent southern Peninsula municipalities, apart initially for Wynberg that only joined in September 1927, into the City of Greater Cape Town on 8 September 1913. Before considering this aspect further, however, we must go back a few years to the time when the municipality of Cape Town itself first set off rather belatedly down the road of electrification.

COMMERCIAL MEMBER

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To the optimist, the glass is half-full. To the pessimist, the glass is half-empty. To the engineer, the glass is twice as big as it needs to be.

A priest, a doctor, and an engineer were waiting one morning for a particularly slow group of golfers. The engineer fumed, "What's with those guys? We must have been waiting for fifteen minutes!"

The doctor chimed in, "I don't know, but I've never seen such inept golf!"

The priest said, "Here comes the green-keeper. Let's have a word with him."

He said, "Hello George, what's wrong with that group ahead of us? They're rather slow, aren't they?"

The green-keeper replied, "Oh, yes. That's a group of blind firemen. They lost their sight saving our clubhouse from a fire last year, so we always let them play for free anytime."

The group fell silent for a moment. The priest said, "That's so sad. I think I will say a special prayer for them tonight." The doctor said, "Good idea. I'm going to contact my ophthalmologist colleague and see if there's anything he can do for them."

The engineer said, "Why can't they play at night?"