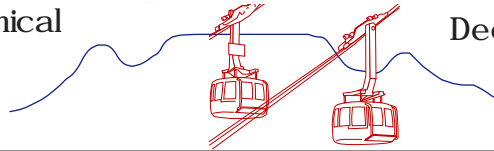


Engineering Bulletin

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

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

EDITORIAL

The shocking event at a factory in Lenasia recently reported in the media in which eleven workers died in a fire because they were unable to escape from a locked building is an indictment on the Health and Safety division of the Department of Labour. This division is the watchdog for the health and safety of workers and the legal body to enforce the provisions of the Health & Safety Act (No 83 of 1993). This Act and its Regulations cover almost every aspect of health and safety which might arise in industry and inspectors have the authority and duty to enforce its requirements. Inspectors are trained to understand the Act and interpret its provisions to employers and users of machinery, and are available to give advice and point out hazards in particular situations. The division has a wealth of knowledge and experience which can be drawn upon by employers and users of machinery. A conscientious employer need only make a call to the Department and help will be provided.

It is the unprincipled and shabby employer who hides away from the law and exploits workers who need the work and are prepared to work without questioning the need for health and safety standards. Such a person will not budget for health and safety equipment or safety training. His personnel will always be at risk. An industrial environment is a hostile environment unless safety standards are put in place. An employer who is not prepared to spend money on the health and safety of his workers should not be in business. The workers are his biggest asset because (robots apart) they operate the machines. A faithful and experienced worker is worth protecting from surrounding hazards to the nth degree. He is worth his weight in gold and should be treated with kid gloves.

The might of the law should be brought down on employers who refuse to implement health and safety standards. They set a bad example which like-thinking people would be tempted to follow. Such people should not be in enterprises which require other personnel. Let them be self employed and take their own risks.

It is time the trade unions had their own trained safety inspectors. This would supplement the work which the Labour Department should be doing. Instead of unions criticizing the standards of safety when serious accidents occur they would better be able to understand the conditions under which employers try to implement the safety laws. The unions are able to put pressure on employers and this pressure could be exerted more reasonably and acceptably if they know the standards set by the law.

Continued on Page 2 col 2

Local Branch News

Hello once again everybody.

We have had an eventful couple of months. Thank you all of you who have let me have email addresses!

On Tuesday 24 October 2000 we arranged a visit to the Cape Technikon. This was really a most interesting visit. I think that the young people studying engineering there are very fortunate! The facilities are so up to date. Unfortunately, true to form, we only had 6 members attend.

The Western Province Technical College held their annual prize giving on 25 October. We were invited and also awarded a prize to the best candidate with GCC subjects.

On Thursday 9 November we presented our seminar on Energy Management. The event was a great success! We had 30 delegates attend and all were very impressed with the quality of the papers and presentations.

On Friday 10 November 2000 we held our annual Dinner / Dance at Italian Club. Our members and sponsors alike very well supported this event. Our National President, Mr. Brian French and his wife came down from Johannesburg and also enjoyed the evening with us.

We did not hold a meeting during November due to the fact that we had already arranged 2 functions and that the venue at ESKOM test and demonstration center was undergoing renovations. Our next event would therefore be the first meeting, which will be the AGM, on Thursday 15 February 2001.

To all members and friends we would like to wish you and your families a Merry Christmas and a Prosperous New Year.

Regards to all and Ciao for now.

Chris Schnehage
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Domestic Electrocution

On Thursday 15 August 1968 a 30 year old domestic worker in a house in Sergeant Street, Somerset West was fatally shocked when she came into contact with an exposed live wire on the cord attached to a Columbus floor polisher/vacuum cleaner.

The domestic was alone in the house in the kitchen. The polisher was plugged into a multiplug into which a refrigerator was also plugged. The polisher stood near the metal sink. At a point on the cabtyre flex 13 ft from the plugtop there was a joint in the flex. The two ends of each the three wires had been twisted together and taped with "friction" tape.

The worker, who was barefoot, wrapped the cord on the handle of the polisher with her right hand whilst holding the metal handle with the left hand. The friction tape had unfurled and during the wrapping of the cord the exposed bare live wire touched her forearm. She received a shock and the sudden stiffening of her body may have caused her left thigh to touch the metal sink. A lethal current passed through her right forearm and her body to the earthed handle and the earthed sink causing the main switch to trip on overload. Death must have been immediate.

When the householder, a school teacher, came home before 3 o'clock he found the domestic lying on the kitchen floor next to the polisher. The domestic worked for him one day a week usually on a Friday, but on this occasion came on a Thursday. He testified at the enquiry that the taped joint appeared safe on the day before the incident. The machine actually belonged to his sister. The incident occurred during the period 9 am to 2.30 pm.

The postmortem report revealed burn marks on the left hand, left thigh and right forearm and that the cause of death was electric shock.

The official enquiry on 13 January 1969 did not reveal why the worker wrapped the cord around the polisher without removing

the plug from its socket. It may have been to temporarily shorten the cord for better manoeuvring of the polisher while polishing the floor. Because the refrigerator was connected to the same socket outlet she would not have wanted to switch off the "fridge".

The worker left home that morning at about 8.30 am for work. At 4.15 pm a Police sergeant came to her home and asked her common-law husband to accompany them to the morgue to identify his wife. He did not know where she went that day to work as she worked for a number of different households.

The Municipal Electrical Department reported the incident on 20 December 1968 and the Department of Labour received notification on 23 December. Legislation requires the user of electricity, i.e. the occupier of the dwelling, to report such an incident to the Labour Department, but such report is exempted if reported to the Police. It is then the duty of the Police to report to the Inspectors.

A few days after the incident the municipal installation inspector went to the home and found:

- the three wires of the rubber cabtyre flex had been joined and wrapped with friction tape which had unfurled exposing the bare conductors. The wires had not parted.
- the plug was a flat two pin plug with a metal earth plate. It was correctly connected and the machine was effectively earthed.
- the installation was correctly wired and safe.
- the kitchen floor was of cement.

COMMENT

This tragic incident occurred before the general use of earth leakage protection. Most people repaired or extended their own cords using twisted connections and friction tape which soon became dry and able to unfurl. The introduction of earth leakage protection must have saved untold lives since those times. These units should be regularly tested (using the test button provided) to ensure that they function correctly.

The simple lesson to be learned from this incident is not to make temporary connections - which tend to become permanent - but to use properly terminated extension cords.

A second obvious lesson is to switch off the plug or remove the plugtop before re-arranging the cord. This can be a nuisance so we all take risks!

Editorial (continued from P1)

It is hoped that the tragedy which occurred in Lenasia will act as a wake-up call to the government and the unions to get into the act and implement the Occupational Health & Safety Act which is an excellent piece of law to keep us on the same footing as the nations with whom we are competing for world trade. Workers well looked after can be the backbone of the nation.

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Money in South Africa

In the first years after the establishment of a trading station in the Cape, the Spanish silver dollar, as in Holland, was the most important form of money. It was later replaced by the Dutch guilder and other currencies.

South Africa's first paper money came into use with the establishment of the Rix dollar in the 1880's. After the British government, the pound sterling was added to the stock of money. It circulated along with many others but from 1881 became the exclusive currency of the Cape and Natal.

The Zuid-Afrikaansche Republiek (which became the Transvaal) used State pounds which were first minted in London in 1874.

From 1892 silver florins and shillings as well as gold pounds, the so-called Krugerpound, were put into circulation. These coins were all made in the newly established mint in Pretoria and were also used in the Free State.

After the Boer War, British sterling became the official currency of South Africa. The South African mint was established as a branch of the Royal Mint of London. The mint was turned over to the South African government in 1941.

Bank notes had been issued since the early 1800's by different financial institutions in the Cape and later in the Transvaal, Free State and Natal. The notes could be exchanged for gold coins.

The South African Reserve Bank was founded in 1920. The Reserve Bank produced its first notes in April 1922 and South African bank notes could be exchanged for gold until 1932.

The sterling monetary system (with 12 pennies in a shilling and 20 shillings in a pound) was replaced by a decimal system on February 14, 1961. With the changover, one pound was worth two rand. At present, after nearly 40 years, the one pound is worth ten rand, a devaluation of half a percent per annum in relation to sterling.



One penny (1955)
One cent (1989)
One cent (1990)

Occupational Health & Safety Act

(No 85 of 1993)

VESSELS UNDER PRESSURE REGULATIONS (VuPR)

Issue No 24

VuPR 13: Inspection and Test

This regulation applies to boilers and pressure vessels.

Boilers

The first activity in subclause No 1 is the installation or re-erection of a boiler. This would be done by a supplier or contractor. The next activity would be the commissioning, which implies the checking of the equipment and safety controls. BUT, before the commissioning this regulation requires that an approved Inspection Authority (AIA) inspects and tests the boiler in situ. The question that arises is: Who is required to carry out the commissioning?

Annexure 1 is the application form for the registration of a boiler. Item 15 on the application requires a commissioning report by an AIA to accompany the application. This means that the AIA must satisfy himself that the boiler has been properly put into commission and complies with the regulations and is safe for operation.

After repair or modification under the supervision of an AIA the inspection, test and commissioning procedure must again be followed and a report submitted to the Department of Labour.

The AIA effectively takes over the work of the earlier machinery inspectors, with the addition of witnessing the commissioning of a boiler.

The subsequent thirty six month inspections and tests are now required to be carried out by a competent person registered for this activity by the SAQCC (SA Welding Institute). By a strange quirk of legislation AIA's must be registered as competent persons for this exercise. They may do the inspection and test before commissioning without being registered, but must be registered for the 36 monthly inspections and tests.

Pressure Vessels

The above discussion applies to pressure vessels as well. This implies that a garage owner who has an air receiver installed must engage an AIA for the initial installation. Thereafter he can use a registered competent person (registered for pressure vessels) for his 36 monthly inspections and tests.

When it is impracticable to use a liquid for the pressure test the regulation makes allowance for an inert gas test at 1.1 times the maximum permissible operating pressure. A large vessel as in the papermaking industry where the load of water on the bearings and foundations would be excessive or the shafts could deflect, this relaxation is needed. A prior internal inspection is required and the procedure for the test must be advised by an AIA.

Exemption may also be applied for from statutory inspection and testing in the case of refrigeration vessels such as ammonia vessels where corrosion is unlikely and where water could block refrigeration piping. Such an application may require the support of an AIA or motivation from the user.

Plant Engineering

June 2000 Plant Engineering Exam Paper (Factories)
Question 8(b)

A moving coil gives full scale deflection with 15mA and has a resistance of 5Ω. Calculate the resistance required:
(i) In parallel to enable the instrument to read up to 1 Amp.
(ii) In series to enable it to read up to 10 Volts. (7)

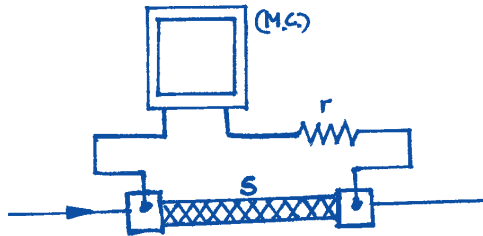


Fig. 1 MC Instrument as an Ammeter

Refer to Figure 1:

S = shunt of low resistance, connected in parallel with the moving coil (MC).
R = resistor connected in series with (MC). The function of (r) is to reduce the error due to the variation of resistance of the (MC) with variation of temperature.

$$(i) \quad \text{current through coil} = \frac{\text{pd. across coil}}{\text{resistance of coil}}$$

$$\text{pd. across coil} = 0.0125 \times 5 = 0.075 \text{ volts}$$

$$\text{current through (S)} = \text{total current} - \text{current through coil} = 1 - 0.015 = 0.985 \text{ amps}$$

$$\text{also:} \quad \text{current through (S)} = \frac{\text{pd across (S)}}{\text{resistance of (S)}}$$

$$\text{therefore:} \quad \text{resistance of (S)} = 0.075 = \frac{0.07614 \Omega}{0.985}$$

As can be seen the resistance of the shunt (S) is very low, so that a large current can be measured by the instrument. In this case it is 1 Amp. Normally these instruments are only suitable for measuring currents up to 50mA. For larger currents the shunt is used.

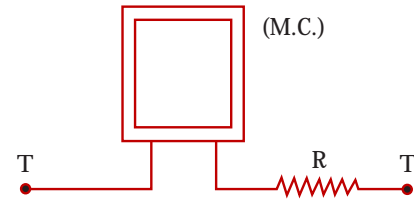
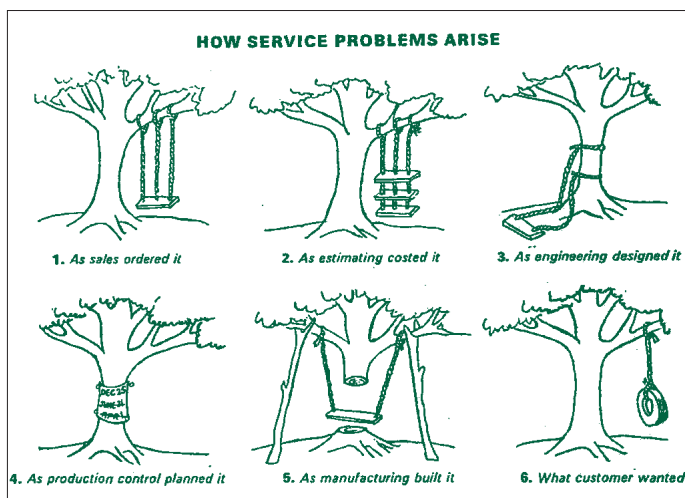


Fig. 2 MC Instrument as a Voltmeter

Refer to Figure 2:

TT = terminals

The scale can be calibrated to read the voltage applied to the terminals TT.

$$(i) \quad \text{current through coil} = \frac{\text{pd. across TT}}{\text{resistance between TT}}$$

$$\text{Resistance between TT} = \frac{10}{0.015} = 666.7\Omega$$

therefore: resistance of (R) required in series with the coil
= total resistance between TT – resistance of coil
= 666.7 – 5 = 661.7Ω

Jorge Pereira
Cert. Eng.

What engineers say-What engineers mean

Major Technological Breakthrough - Back to the drawing board.

Developed after years of intensive research - It was discovered by accident.

Project slightly behind original schedule due to unforeseen difficulties - We are working on something else.

The designs are well within allowable limits - We just made it, stretching a point or two.

Customer satisfaction is believed assured - We are so far behind schedule that the customer was happy to get anything at all from us.

Close project co-ordination - we should have asked someone else; or, let's spread the responsibility for this.

The design will be finalised in the next reporting period - We haven't started this job yet, but we've got to say something.

A number of different approaches are being tried - We don't know where we're going, but we're moving.

Test results were extremely gratifying - It works, and are we surprised!

Extensive effort is being applied on a fresh approach to the problem - We just hired three new guys, and we'll let them kick it around for a while.

Preliminary operational tests are inconclusive - The darn thing blew up when we turned it on.

The entire concept will have to be abandoned - The only guy who understood the thing quit.

Modificatins are underway to correct certain minor difficulties - We threw the whole thing out and are starting from scratch.