Fusion

Newsletter of the Southern African Institute of Welding

Aug/Sep 2016

SAIW
Southern African Institute of Welding

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SAIW Testing Laboratory ISO 17025 Accredited

The SAIW's testing laboratory has been ISO 17025 accredited by the South African National Accreditation System (SANAS) and according to SAIW executive director, Sean Blake, this is a significant step in the expansion of the services provided by the lab.

"This is the single most important standard for calibration and testing laboratories in this country – and probably in the world. It confirms unequivocally that our testing lab is technically competent and that it is able to produce precise and accurate test results," Blake says.

OUR LAB HAS A WELL-DOCUMENTED QUALITY MANAGEMENT SYSTEM AND OUR ACCREDITATION IS CONFIRMATION OF OUR RELIABILITY AND PROFESSIONALISM.

The ISO 17025 standard comprises five elements: Scope, Normative References, Terms and Definitions and the two most important, Management Requirements, which are primarily related to the operation and effectiveness of the quality management system within the laboratory, and Technical Requirements, which include the factors that determine the correctness and reliability of the tests performed.

Dr. Surekha Krishnan, SAIW's project manager and technical signatory for the materials testing lab says that the SAIW lab uses ISO 17025 to implement a quality system that ensures the consistent production of valid results. "I am pleased to say that our lab has a well-documented quality management system and our accreditation is confirmation of our reliability and professionalism," she says.

The lab has been ISO 17025 accredited for tensile, bend, hardness (Vickers and Rockwell), impact and chemical analysis tests. It will also shortly be ISO 17025 accredited for NDT techniques – namely liquid penetrant testing, magnetic particle testing, ultrasonic testing and radiographic testing.

Dr Krishnan adds that the SAIW testing lab is playing an increasing role in helping the local welding and related industries to test the quality of their processes. "Pre-testing of critical elements is fundamental to the safety of our industry and, as an Institute and the leading welder training organisation in Africa, it is important that we are able to provide a world class service in this domain. This accreditation is proof that we do and I am sure that we will now be able to grow our customer base significantly", she says.

SANAS, an agency of the Department of Trade and Industries (dti), was established in terms of Section 3(1) of the Accreditation for Conformity Assessment Calibration and Good Laboratory Practice Act, 2006 (Act No. 19 of 2006). Blake says that in terms of one of SANAS's main aims of promoting accreditation as a means of facilitating international trade and enhancing South Africa's economic performance and transformation, he has no doubt that the accreditation of the SAIW testing laboratory will do just that in the welding industry locally and abroad – especially in Africa.

SAIW Lab project manager Dr. Surekha Krishnan (left) with lab technician Confidence Lekoane

Going nuclear …

…lessons for the welding industry from France

Introduction

Following a visit by a French delegation to the SAIW facility in February 2016, an invitation was extended by Areva for me to visit their Heavy Equipment Manufacturing facility in Chalon/Saint-Marcel, France. This facility, which opened in 1976, and primarily manufactures the Steam Generators for the EPR Nuclear Power Plant, built some of the components for the Koeberg Nuclear Power Station and some of the components for the Koeberg steam generator replacement project are planned to be manufactured there. I recently took the opportunity to visit the facility and it became very clear to me that if we are to be able to service, from a welding perspective, a future nuclear industry in South Africa we will have to up our game substantially. The quality and professionalism of the Areva facility is simply outstanding.

Areva's Chalon/Saint-Marcel Heavy Equipment Manufacturing Facility

AREVA Heavy Equipment Manufacturing Facility

Manufacturing methods have been studied and developed specifically for Areva's activities over a period of more than 30 years. A key example of this is the drilling and broaching process where tubes of up to 600mm thick are drilled and broached with an accuracy of 0.01mm. A matching sample is kept of every tube sheet bored as a quality control requirement.

All assembly operations are conducted in clean rooms. Unfortunately, due to the cleanliness requirements and rules of the facility, I was not able to enter the assembly area, however, I could view the operation from the outside through a glass window. The assembly is carefully controlled with each item being identified and weighed with multiple checks to ensure proper assembly.

Within the facility, there is a welding technology department, which is working on a number of new welding developments including developing welding processes for the ITER Tokamak nuclear fusion project, where, in southern France, 35 nations are collaborating to build the world's largest tokamak, a magnetic fusion device that has been designed to prove the feasibility of fusion as a large-scale and carbon-free source of energy based on the same principle that powers our sun and stars.

The welding technology department is also working on the development of GMAW welding techniques as well as the automatic feed of filler material for GTAW welding in order to improve productivity and automation.

Within the facility they also have a welder training and testing facility, which is manned with training instructors and welding management. In order to work on the nuclear components as a welder, a minimum of at least 10-years training and experience is required.

Interestingly, Areva is using Electro Slag Welding as a weld build-up and cladding technique. The process is preferred for some applications due to the low dilution achieved. This welding application was not witnessed in the facility but was mentioned during discussion. Within the facility they are also using robotic GMAW welding as a cladding process. TIG ER (Electric Resistance of feed wire) is utilised in order to improve productivity.

The facility has a second welder training facility that is remote from the manufacturing facility. Here there are two welding bays with simulated environments where welders are trained and tested in a working environment (temperature and humidity controlled) with jigs for restricted access. Much of this training facility was dedicated to the use of automated welding techniques with training and development of narrow chamfer orbital TIG.

The Areva Heavy Equipment Manufacturing facility employs 364 operators - of which 62 are boilermakers and 80 are welders - 348 technicians and 205 managers and engineers. Due to the nature and quality requirements of the product manufactured at this facility, there is a high ratio of engineers and technicians to operators. Quality control and engineering are key factors in this operation with a ratio of one manufacturing hour for each engineering hour. ■

In the next Fusion read about Sean's visit to the Alstom Transport site in Le Creusot and Areva's Non Destructive Examination Technical Centre.

Sean Blake

Angel in heaven over her internship with leading fabricator

Nonhlanhla Angel Mthebula says she's "in heaven" with her internship with leading dome-structures manufacturer In2Structures. "I have been working hard at the SAIW to progress in my International Welder programme and I will now have the chance to implement what I have learnt in the "real world"," she says.

(L-R) Linda Wijnberger, Angel Mthebula and SAIW's Michelle Warmback on the premises of In2Structures

The internship materialised after In2Structures made a donation to the SAIW Foundation for Angel's training on the SAIW's IIW International Welder training programme. "As a result of this donation, Angel's training is being extended to include GMAW welder training and welding aluminium and, also, part of the deal was that she would do the internship at In2Structures," says SAIW executive director Sean Blake.

Blake adds that this agreement between In2Structures and the SAIW represents an excellent win-win situation. "As In2Structures' core business is welding, they wanted to give something back to the welding community while improving their BBBEE score on skills development through investing in the training of a black female welder. On the other hand, the SAIW Foundation requires funds to train more previously disadvantaged people in the welding field. This was such an easy way for both parties to meet their individual objectives and we hope that other companies follow In2Structures example," Blake says.

Angel is part of the first ever group of trainees that was brought to the SAIW for training through funding by the SAIW Foundation, a company which the Institute started as a public benefit organisation to provide training to disadvantaged individuals in a wide range of areas including welding and inspection, the training of trainers for welding and related technologies and more.

In2Structures is an ideal place for a young trainee to get practical welding experience. Part of the Gearhouse group, it is one of Africa's leading fabricators of custom-designed dome structures, which are generally used as portable facilities for a variety of uses.

"We are delighted to have Angel on board," says In2Structures' director Linda Wijnberger. "The structures we fabricate are clearspan, load-bearing domes in which the welded joints are the critical foundations of the structure's stability. Angel will be learning from the best and this will be an important step in her welding career," she says.

Outstanding Achievement from Jaco van Deventer

Jaco van Deventer, previous winner of the local welding industry's Young Welder of the Year competition, hosted by the Southern African Institute of Welding (SAIW), has been placed second in the in the Youth Group for the Finished Product Welding category at the Arc Cup hosted by the Chinese Welding Society (CWS) and supported by the International Institute of Welding (IIW).

There were a total of 304 competitors representing 24 countries apart from China. The Chinese contingent included 17 Chinese state-owned large enterprises and 15 Chinese vocational schools.

The Arc Cup, which is regarded as the second most prestigious international welding competition after the international WorldSkills event, was originally the Chinese national welding competition for the selection of the Chinese WorldSkills participants. It was then opened to international participation in order to expand the opportunity for welders to get used to WorldSkills competition conditions.

"To get second place in this competition is nothing short of amazing," says the SAIW's Etienne Nel who was the South African Expert at the competition. "Jaco has proven himself to be one of the best young welders in the world and he deserves every accolade."

Danie Eksteen, Technical Training Manager at Steinmuller, where Jaco is employed, says he and the entire company are proud of his achievement. "The circumstances under which Jaco had to work in this competition were, to say the least, extremely difficult. He achieved this result through discipline, application and hard work. It was indeed a most courageous effort," says Eksteen.

Jaco says that he is over the moon with the result. "Sometimes the temperature reached nearly 40°C in the work centre and there was little or no water. It was difficult to concentrate but I knew I just had to persevere," he says.

He added that he must thank Danie and Etienne for their help and dedication. "Without them I could not have achieved what I did," he concluded.

Jaco entered the GMAW (135) process and selected to weld a pipe in the 6G position as an elective element of the competition.

ON THE ROAD TO SUCCESS

Once again the learners at the SAIW have excelled and so many men and women have demonstrated that welding is indeed a 'miracle career'! Gone are the days when welding is perceived only as men using a welding rod and oil bath transformer to fix the odd gate. Today welding knows no gender! It is a diverse and multifaceted discipline that is one the foundations of the development of the modern world. So, congratulations to you all and may your example inspire many more people to find a place, or to improve themselves, in this wonderful industry.

Here is a selection of some of the graduates receiving their Awards

TECHNOLOGIST

Melba Mothapo

Phumudzo Mudau

SPECIALIST

Mahudu Moganedi & Emma Sekele

Treasure Ndlovu & partner

Ugur Gun & partner

WELDING INSPECTOR LEVEL ONE

WELDING INSPECTOR LEVEL ONE – DISTINCTION

Adriaan Botha

Gianfranco Manenti

Jacques Schepers

Hendrik Erasmus

SENIOR WELDING INSPECTOR LEVEL TWO

SENIOR WELDING INSPECTOR LEVEL TWO WITH IIW (S)

ON THE ROAD TO SUCCESS *(continued)*

Some of the Western Cape graduates

INTERNATIONAL WELDING TECHNOLOGIST

Earl Phillips

SENIOR WELDING INSPECTOR LEVEL 2 WITH IIW (S)

Juan Bernado

SENIOR WELDING INSPECTOR LEVEL 2 WITH IIW (S) WITH DISTINCTION

Berita Blaauw

WELDING INSPECTOR LEVEL 1

SENIOR WELDING INSPECTOR LEVEL 2

SENIOR WELDING INSPECTOR LEVEL 2 WITH DISTINCTION

Zobair Adams

In the SPOTLIGHT

BENOIT LAMOTTE

IN OUR SERIES OF PROFILES ON PEOPLE WHO HAVE MADE A DIFFERENCE TO THE WELDING INDUSTRY AND THE SAIW, WE TALK TO BENOIT LAMOTTE, REGIONAL DIRECTOR OF LINCOLN ELECTRIC SUB-SAHARAN AFRICA. BORN IN 1970 IN PARIS, FRANCE, HE DID HIS SCHOOLING AT PLACE DE LA BASTILLE AND THE LYCÉE DES FRANCS BOURGEOIS IN PARIS. THEREAFTER BENOIT WENT TO THE UNIVERSITY OF PARIS VI AND DID ENGINEERING SPECIALISING IN MATERIAL SCIENCE - POLYMERS, CERAMIC, METALLURGY. AFTER COMPLETING THIS IN 1993 HE SPECIALISED IN METALLURGY AT THE INSTITUT NATIONAL DES SCIENCES ET TECHNIQUES NUCLEAIRES.

THROUGH THE FRENCH WELDING INSTITUTE BENOIT DID WELDING ENGINEERING IN 1996 AND THEN COMPLETED AN INDUSTRIAL BUSINESS DEVELOPMENT PROGRAM IN 2002 AT THE THUNDERBIRD UNIVERSITY IN PHOENIX, ARIZONA.

BENOIT HAS BEEN MARRIED TO STÉPHANIE FOR 19 YEARS AND THEY HAVE TWO CHILDREN, ADELE (15) AND BAPTISTE (13). HE LIKES SPENDING HIS SPARE TIME WITH THEM, PLAYING TENNIS, GOLF AND EXPLORING THE OUTDOORS.

F:* *What got you interested in metallurgy?

BL: I'm not really sure. Even at a young age I was fascinated with steel and metals and welding. During my studies, Metallurgy quickly became a passion and my first appointment as a welding engineer in 1995 was an eye-opener in that field, which I have been in ever since. I have also had experience across the board and I have worked in technical support, marketing and sales and general management.

F:* *Could you tell us a bit about your career

BL: My first appointment as a Welding Engineer was in 1995 at Arbel Fauvet Rail – Douai, France. In 1999 I started with Lincoln Electric and I have been there ever since. I have been in several positions with them, starting as a Welding Engineer with Lincoln Electric France specialising in technical support. I was promoted to Weld Tech Centre Manager in 2002 and in 2007 I became Regional Manager of Lincoln Electric – North, West & Central Africa, Indian Ocean and in 2011 I took up my current position in South Africa.

F:* *What do you think of the standard of welding in South Africa and comment on the role that the SAIW is playing.

BL: The standard of welding in South Africa is easily one of the best in Africa, far ahead in some segments like automotive and oil & gas where there is a high level of automation. My only concern is that numbers of people attaining welder qualification still needs improvement. The industry should use the SAIW, which is easily the leading welder training organisation in Africa providing world class welder training and education, to uplift skills.

F:* *What do you feel about the prospects for the welding industry in general in South Africa in the long-term.

BL: The welding Industry is facing a very difficult time here, with low commodity prices and very few projects. But this will change and, in the long-term, with its high level of expertise in turnkey solutions and excellent understanding of the African market, SA should be a leading welding hub for African projects.

F:* *Any comments on the macro economic situation in South Africa and globally and how this affects the local welding/steel industry.

BL: The global macro-economic situation is clearly negatively impacting the RSA and sub-Saharan Africa economies. Most of the players in our industry should take advantage of this period of low activity to analyse their processes and improve their productivity in order to be ready for the pick-up. Lincoln Electric South Africa has spent money, time and effort to help in this process by strengthening its technical team with a new Welding Engineer, and a brand new Weld Tech Centre in Midrand. This facility is equipped with the latest technology and is open to all our partners and customers to develop and review more effective solutions.

Inspectors of Pressurised Equipment – Piping Only

As discussed in an earlier edition of Fusion, the SAQCC IPE announced that limited scope of certification of inspectors working on piping only would be introduced.

This decision was made because of the inclusion of piping in the definition of pressurised equipment in the current Pressure Equipment Regulations (PER) and the subsequent involvement of Inspectors of Pressurised Equipment (IPE's) during the manufacture and/or repairs of piping working under the auspices of an Approved Inspection Authority (AIA).

The requirements for registering as an Inspector of Pressurised Equipment Piping Only will be:

- Proven knowledge of welding and fabrication inspection. **(SAIW L1 & L2 or approved equivalent)**
- Proven knowledge of evaluation of radiographs. **(SAIW RT Interpreters or approved equivalent)**
- Proven knowledge of the content of design and manufacturing codes commonly used in industry. **(SAIW ASME Code course or approved equivalent)**
- Proven knowledge of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) Pressure Equipment Regulations and the Mine Health and Safety Act 1996 (ACT 29 of 1996). **(Covered in SAIW L2 course)**
- Has met the minimum practical and classroom training requirements as per **Table 1** below with verification by certified IPE working under the auspices of an AIA and must clearly indicate the involvement of the trainee.
- Is capable of and physically able to perform all activities involved in the duties of an IPE and shall:
    - submit a record of visual acuity tested within six months prior to the date of application. This must be submitted on the standard SAQCC-IPE vision record form and must be an original document signed and stamped by the optometrist. This vision test record shall certify that the applicant is able to read J1 (or N5) letters on the standard Jaeger or equivalent test chart at 300 mm and J7 (or N10) at 1000 mm, with at least one corrected eye or uncorrected eye and of at least 6/6 on a Snellen chart or orthorator, and
    - have clinically assessed normal fields of vision

The minimum duration of training accepted by SAQCC – IPE for Piping only will be two years and all documents submitted for application must be originals or certified copies of originals.

Related inspection tasks for piping practical training or experience requirements (SANS 347 Cat II and higher)

Inspection Authority function	Inspector's tasks	Remarks	Minimum practical training
1. Verification that the design of all parts of the pipeline and repairs and modifications are in accordance with the requirements of the applicable approved code	Establish that the manufacturer / repairer is working to drawings approved by a piping designer. The piping designer shall be an appropriately professional person (i.e. registered Pr. Eng. Pr. Technologist or Pr. Cert. Eng.) as required by SANS 347.		Perform inspector tasks on 10 different designs. The pipelines shall have: (1) at least 5 different piping components e.g pipe, elbows, t-pieces, etc. (2) at least 10 welds per design, (3) system 4" piping and above.
2. Verification that an agreed quality plan is to be implemented. Incorporate inspection authority requirements for witness, hold and surveillance points.	Where applicable, verify that the quality plan is approved by manufacturer, client and inspection authority. Incorporate inspection authority requirements for witness, hold and surveillance points. Sign and complete the inspection stage requirements of the inspection authority.	This is not a code requirement but a quality plan is a generally accepted requirement of all parties	Perform inspector tasks on 10 different designs (different design means not exactly the same line).
3. Correlation of material certificates with materials of construction and checking conformity of material specification.	Correlate material certificates with materials and check conformity to specification.		Correlation of certificates for 5 different materials.
4. Identification of material and witnessing of transfer identification	Identify material and witness transfer identification.		Witness 5 material identification transfers.
5. Examination of material cut edges and/or heat affected zones.	Visually examine material.		Examination of material for 10 pipelines. See note 1 on page 11.

Related inspection tasks for practical training

Inspection Authority function	Inspector's tasks	Remarks	Minimum practical training
6. Approval of welding procedures.	Verify that applicable approved welding procedures are being used and followed. Where procedures have not been previously approved by an inspection authority, the inspector witnesses the production procedure test plates, the mechanical testing of test pieces prepared from the components, evaluates the results and validates applicable reports.	The inspection authority should have specifically designated persons to approve welding procedures for use in consultation.	Verification of 5 procedures. Witnessing of 5 different procedure tests and validating applicable reports.
7. Approval of welders and operators	Verify that welders who are qualified to the appropriate code are being used. Where welders are required to undergo testing, the inspector who witnessed production of the test plate, evaluates the results of the examination of the plate and validates applicable reports.		Acceptance of documentation for 5 welders. Witnessing and acceptance of 5 different test plates and validating applicable reports.
8. Examination of fit-up of seams for welding including dimensional check, examination of weld preparations, tack welds, etc.	Examine fit-up of seams for welding. Verify results of dimensional checks. Examine weld preparations and tack welds.		Examination of 10 different pipelines incorporating examination of joints of 5 different piping components. See Note 1 on page 11.
9. Examine and accept non-destructive test reports. Verify compliance with agreed procedure and acceptability of any defects. Where necessary, the inspection authority may need to verify results by practical examination.	Evaluate radiographs and accept or reject components on such evaluation. Verify NDT personnel qualifications. Verify defects reported by NDT personnel as to their acceptability against a code. Examine NDT procedures, techniques, sheets and/or reports for compliance as having being signed / authorised by the recognised competent personnel. All other NDT tasks must be performed by the manufacturer's / repairer's or inspection authority's specialised personnel.	The inspection authority should have access to specifically designated persons to approve all relevant NDT procedures.	Acceptance of complete sets of radiographs for 10 different pipelines.
10. Examine heat treatment records and verify compliance with procedure.	The inspector may witness that pre-and post-heat treatments are performed in accordance with approved procedures if this requirement is included in the quality plan. Examine heat treatment records and verify compliance with procedures.	Witnessing heat treatment is not a code requirement.	Examination and verification of 5 separate heat treatments incorporating pre and post weld heat treatment using furnace and local heat treatment methods.
11. Witness the pressure test and where necessary, record the amount of permanent set.	Witness the pressure test and verify code requirements. Where necessary, record the amount of permanent set.		Witnessing of test on 10 different pipelines.
12. Final visual examination	The inspector should visually examine the completed manufactured pipeline, as relevant, internally and externally.	Where possible, this should be carried out before and after pressure testing.	Examination of 10 different pipelines.
13. Collation of documentation	Verify collation of documentation for data pack or repair report.	This in not a code requirement.	10 Pipelines.
14. Sign certificate of manufacture.	Verify certification details and co-sign certification with the manufacturer.	The inspector must be registered to carry out his work.	Witness the signing of certificate of manufacture for 10 pipelines.

Continued on page 11

JOB KNOWLEDGE 121

Power source characteristics

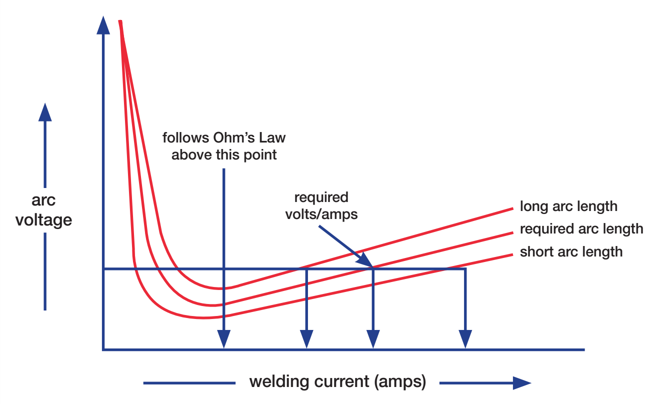

Fig. 1. Static arc characteristic

The prime objective of an arc welding power source is to deliver controllable welding current at a voltage demanded by the welding process. The arc welding processes have different requirements with respect to the controls necessary to give the required welding conditions and these in their turn influence the design of the power source. In order to understand how the requirements of the processes affect the design of the power source it is necessary to understand the interaction of the power source and the arc characteristics.

If the voltage of a welding arc at varying arc lengths is plotted against the welding current the curves illustrated in Fig. 1 are obtained. The highest voltage is the open circuit voltage of the power source. Once the arc is struck the voltage rapidly falls as the gases in the arc gap become ionised and electrically conductive, the electrode heats up and the size of the arc column increases. The welding current increases as the voltage falls until a point is reached at which time the voltage/current relationship becomes linear and begins to follow Ohms Law. What is important to note from Fig. 1 is that as the arc length changes both the voltage and welding current also change – a longer arc giving higher voltage but with a corresponding drop in welding current and vice versa. This characteristic of the welding arc affects the design of the power source since large changes in welding current in manual metallic arc (MMA) and TIG welding is undesirable but is essential for the MIG/MAG and flux cored arc welding processes.

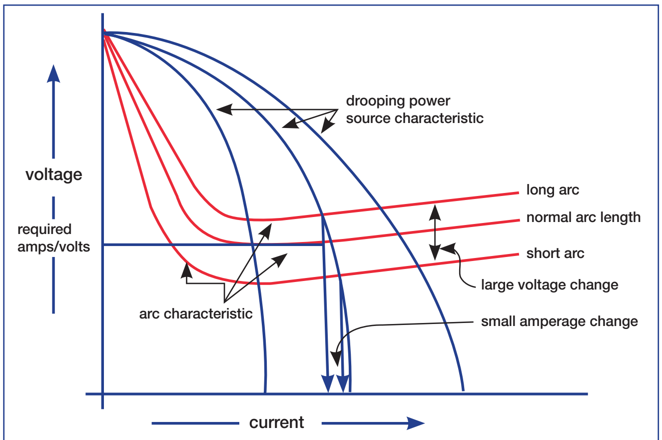

Fig 2 Constant current power source characteristic

MMA, TIG and submerged arc power sources are therefore designed with what is known as a drooping output or constant current static characteristic, MIG/MAG and FCAW power sources with a flat or constant voltage static characteristic. On most power sources the slope of the characteristic can be changed either to flatten or make steeper the curves shown in Fig 2 and Fig. 3

Fig 2 shows drooping or constant current power source static characteristics, such as would be used for the MMA or TIG process, superimposed on the arc characteristic curves. When manual welding is taking place the arc length is continually changing as the welder cannot maintain a constant arc length. With a constant current power source as the arc length changes due to the welder's manipulation of the welding torch there is only a small change in the welding current – the steeper the curve the smaller the change in current so there will be no current surges and a stable welding condition is achieved. Since it is primarily the welding current that determines such features as the penetration and electrode consumption this means that the arc length is less critical, making the welder's task easier in achieving sound defect free welds. Typically, a ±5volt change would result in around a ±8 amp change at 150amp welding current.

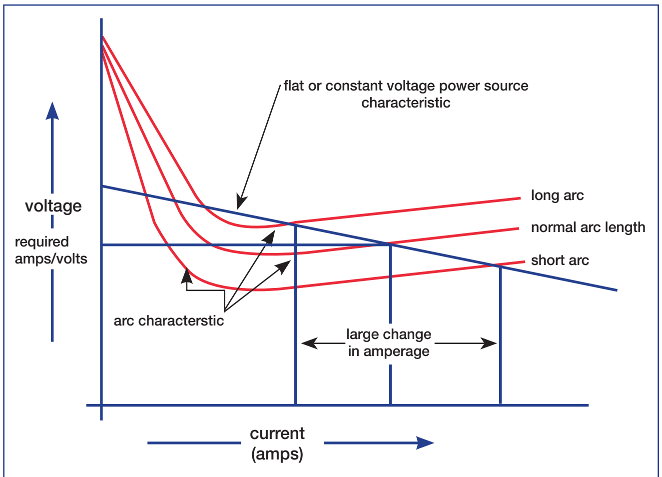

Fig. 3 Constant voltage power source characteristic

In some situations – for example when welding in the overhead position or when the welder is faced with variable root gaps - it is an advantage if the welder has rather more control over deposition rates by enabling him to vary the rate by changing the arc length. In such a situation a flatter power source characteristic will be of benefit.

Submerged arc welding also uses a drooping characteristic power source where the welding current and the electrode feed rate are matched to the rate at which the wire is melted and transferred across the arc and into the weld pool – the "burn-off rate". This matching of parameters is carried out by a monitoring system which uses the arc voltage to control the electrode feed speed – if the arc length/voltage increases the wire feed speed is increased to restore equilibrium.The constant voltage power source characteristic is illustrated in Fig. 3. This shows that as the arc length and hence the voltage changes there is a large change in the welding current – as the arc lengthens the welding current falls, as the arc shortens the current increases.

With MIG/MAG and FCAW power sources the welding current is controlled by the wire feed speed, the welding current determining the rate at which the welding wire is melted and transferred across the arc and into the weld pool – the "burn-off" rate. Therefore, as the current decreases the burn-off rate also falls, less wire is melted and the wire tip approaches the weld pool. In doing so, the voltage decreases, the welding current and hence the burn-off rate increase. Since the wire feed speed is constant there is a surplus of burn-off over wire feed such that the desired arc length, voltage and current are re-established. The converse also occurs – a shortening of the arc causes a reduction in voltage, the current rises, the burn-off rate increases, causing the arc to lengthen, the voltage to increase and the welding current to fall until the pre-set welding conditions are re-established. Again, a typical figure for the change in welding current for a constant voltage power source would be in the region of ±40amps for a change in arc length of ±5volts. This feature gives us what is known as a "self-adjusting arc" where changes in arc length, voltage and current are automatically returned to the required values, producing stable welding conditions. This makes the welder's task somewhat easier when compared with MMA or TIG welding. Although in principle it may be possible to use a constant voltage characteristic power source for MMA welding it is far more difficult for the welder to judge burn-off rate than arc length so arc instability results and the method is not practicable.

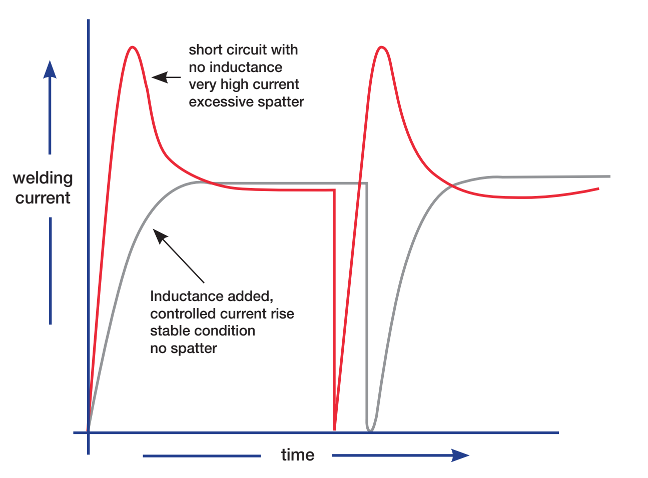

Fig 4 The level of inductance on short circuit transfer

In addition to this voltage control of the welding arc the speed at which the power source responds to short circuiting is important - this is known as the power source dynamic characteristic. Short circuits occur during arc striking and in MIG/MAG welding during dip transfer. As the voltage drops to zero when a short circuit occurs the current rises. If this increase in the current is fast and uncontrolled then the electrode tip blows like an electrical fuse resulting in excessive spatter – too slow a rise and the electrode may stub into the weld pool and extinguish the arc. This is not too significant when using the MMA process since the maximum current at zero voltage is controlled by the slope of the static characteristic curve and the welder can easily establish an arc gap. It is, however, important in the MIG/MAG process where a flat static characteristic power source is used and the current could rise to an extremely high value, in particular when welding in the dip transfer or short circuiting condition.

An electrical component called an inductor is therefore introduced into the power source electrical circuit. This device opposes changes in the welding current and hence slows the rate at which the current increases during a short circuit. The inductance is variable and can be adjusted to give a stable condition as shown in Fig. 4. Inductance in the welding circuit also results in fewer short circuits per second and a longer arc-on time - this gives a smoother better shaped weld bead. Too much inductance, however, may result in such a slow rise in the welding current that there is insufficient time for the arc to re-establish and melt the wire tip so that the welding wire then stubs into the weld pool. Inductance during spray transfer is also helpful in providing a better and less violent arc start.

This article was written by Gene Mathers.

Inspectors of Pressurised Equipment – Piping Only *Continued from page 9*

Note 1: Where training is gained on repairs and modifications, the scope of work must be such that the replacements of different types of piping components are included. This provision is included to ensure that such inspectors gain adequate training of the complexities involved in new pipeline construction.

Note 2: The requirement for practical training that it is to take place over a two-year period is to ensure that adequate experience is obtained in performing the 14 tasks. The requirement for training on the manufacture, modification or major repair on ten different pipelines is a minimum requirement.

Congratulations

SAQCC – IPE is proud to announce that Arthur McKay has been the first applicant to be certified to Inspector of Pressurised Equipment Piping Only.

Arthur has been involved in Inspection for the last 38 years at various manufacturing companies both in the United Kingdom and South Africa. He is currently employed by PIPETECH CC as a Senior Inspector and has worked as Chief Inspector on many piping projects throughout South Africa.

Focus on Standards

ISO 14175 - Welding consumables. Gases and gas mixtures for fusion welding and allied processes

Welding is a world that is characterised by the use of standards, and the shielding gases used are no different. We are well acquainted with the classification of welding electrodes in terms of the AWS classification system, eg. A5.1 E6013, which has been adopted by ASME as per the matching SFA classification. However, the classification of shielding gases is not particularly well implemented in our industry. We seldom see shielding gases being classified in accordance with a standard in the market place, and the appropriate classification is also not stated on the welding documentation. This **Focus on Standards** article deals with ISO 14175:2008 which classifies shielding gases in accordance to the composition and use of the shielding gas.

Scope

The purpose of this standard is to classify and designate shielding, backing, process and assist gases in accordance with their chemical properties and metallurgical behaviour as the basis for correct selection by the user and to simplify the possible approval procedures. Therefore, as with the welding electrode, changing suppliers of welding consumables does not necessarily require that the welding procedure needs to be re-qualified if the consumable meets the same technical requirements, i.e. changing the consumable will not change the technical properties of the weld in any way.

The standard states that gas purities and mixing tolerances are specified as delivered by the supplier (manufacturer) and not at the point of use. Gases or gas mixtures may be supplied in either liquid or gaseous form but when used for welding and allied processes, the gases are always used in the gaseous form.

ISO 14175 does not cover fuel gases, such as acetylene, natural gas, propane, and resonator gases, as used in laser applications.

Definitions

The standard defines the base gas as the major or only component of a pure or mixed gas. A component is defined as a gaseous substance that is essential to the performance of the gas mixture. An impurity is a substance with a different chemical composition than that of the base or component gas.

Properties of gases

The physical properties of the gas components are detailed along with the reactivity during welding. Argon and helium are inert gases, carbon dioxide and oxygen are oxidizing, whilst hydrogen is reducing. Nitrogen has low reactivity, however the influence of nitrogen varies with different materials and applications.

Classification and Designation

The core of the standard revolves around this section which deals with classification and designation of the shielding gases. The classification of the gas is in accordance to the reactivity of the gas or gas mixture. Table 1 has been reproduced opposite from the standard and provides the composition ranges for the different categories of shielding gases.

The **designation** of the shielding gas provides further information as to the nominal composition of the mixture.

The letters and numbers used in the main group are as follows:

I:	Inert gases and inert gas mixtures
M1, M2 & M3:	Oxidising mixtures containing oxygen and/or carbon dioxide
C:	Highly oxidising gas and highly oxidising mixtures
R:	Reducing gas mixtures
N:	Low reactive gas or reducing gas mixtures, containing nitrogen
O:	Oxygen
Z:	Gas mixtures containing components not listed or mixtures outside the composition ranges listed in table 1.

The main group, except Z, is divided into sub-groups based on the presence and level of different components having an influence on the reactivity (see table 1).

Gases and gas mixtures are designated by the classification and the symbols of their chemical components as below, followed by the corresponding nominal composition in % volume:
– A: Argon
– C: Carbon dioxide
– H: Hydrogen
– N: Nitrogen
– O: Oxygen
– He: Helium

Commonly used shielding gases for welding applications would be classified as follows:

Pure Argon for TIG (GTAW) welding
Classification: ISO 14175 – SG – I1
Designation: ISO 14175 – SG – I1 - A

Pure Carbon Dioxide for MAG (GMAW) welding of heavy sections
Classification: ISO 14175 – SG – C1
Designation: ISO 14175 – SG – C1 - C

Three part mixture of 5% CO2, 2% O2 balance Ar for light sections
Classification: ISO 14175 – SG – M14
Designation: ISO 14175 – SG – M14 – ACO – 5/2

Two part mixture of 20% CO2, balance Ar for FCAW
Classification: ISO 14175 – SG – M21
Designation: ISO 14175 – SG – M21 – AC – 20

The letters indicating the composition of the gas are in descending order of the nominal composition. For example, for the designation of ISO 14175 – SG – M14 – ACO – 5/2, ACO refers to

A = 93% Argon (being the balance)
C = 5% Carbon Dioxide
O = 2% Oxygen

Table 1: Classification of process gases for fusion welding and allied processes

Symbol		Components in nominal percentage of volume					
Main Group	Sub-Group	Oxidizing		Inert		Reducing	Low reactivity
		CO_2	O_2	Ar	He	H_2	N_2
I	1			100			
M1 [b]	2				100		
	3			balance	$0,5 \le He \le 95$		
M2 [b]	1	$0,3 \le CO_2 \le 5$		balance [a]		$0,5 \le H \le 5$	
	2	$0,3 \le CO_2 \le 5$		balance [a]			
	3		$0,5 \le O_2 \le 3$	balance [a]			
	4	$0,3 \le CO_2 \le 5$	$0,5 \le O_2 \le 3$	balance [a]			
M2 [b]	0	$0,3 < CO_2 \le 15$		balance [a]			
	1	$15 < CO_2 \le 25$		balance [a]			
	2		$3 < O_2 \le 10$	balance [a]			
	3	$0,5 \le CO_2 \le 5$	$3 < O_2 \le 10$	balance [a]			
	4	$5 < CO_2 \le 15$	$0,5 < O_2 \le 3$	balance [a]			
	5	$5 < CO_2 \le 15$	$3 < O_2 \le 10$	balance [a]			
	6	$15 < CO_2 \le 25$	$0,5 < O_2 \le 3$	balance [a]			
	7	$15 < CO_2 \le 25$	$3 < O_2 \le 10$	balance [a]			
M3 [b]	1	$25 < CO_2 \le 50$		balance [a]			
	2		$10 < O_2 \le 15$	balance [a]			
	3	$25 < CO_2 \le 50$	$2 < O_2 \le 10$	balance [a]			
	4	$5 < CO_2 \le 25$	$10 < O_2 \le 15$	balance [a]			
	5	$25 < CO_2 \le 50$	$10 < O_2 \le 15$	balance [a]			
C	1	100					
	2	balance	$0,5 < O_2 \le 30$				
R	1			balance [a]		$0,5 \le H_2 \le 15$	
	2			balance [a]		$15 < H_2 \le 50$	
N	1						100
	2			balance [a]			$0,5 \le N_2 \le 5$
	3			balance [a]			$5 < N_2 \le 50$
	4			balance [a]		$0,5 \le H_2 \le 10$	$0,5 \le N_2 \le 5$
	5					$0,5 < H_2 \le 50$	Balance
O	1		100				

[a] For the purpose of this classification, argon and helium may be interchanged.

[b] CO_2 in gas mixtures may liquefy at low temperature and high pressure. The result can be variation in the composition of the gas mixtre withdrawn from the container.

Gas mixtures for which the chemical composition is not listed in the table shall be prefixed by the letter Z. The chemical composition ranges are not specified and therefore two gas nmixtures with the same Z-classification may not be interchangeable.

The standard provides further information on the tolerance for the shielding gas mixtures, purities and dew-points of the mixtures, testing and re-testing requirements and the marking of the cylinders.

The classification and designation of shielding gases is not new, ISO 14175 was preceded by EN 439. AWS 5.32 has also been in existence for a long time as part of the AWS / ASME welding consumables standards. This standard primarily classifies the shielding gas by the nominal composition and does not make use of any groupings where similar weld characteristics will be obtained as used in ISO 14175.

Weld procedures qualified in accordance to ISO 15614-1 with a shielding gas with the same symbol eg M21, are valid for varying shielding gas compositions with the same symbol, subject to the restriction of the qualifying standard. This is not the case for procedures qualified in accordance to ASME IX where the nominal gas composition is an essential variable thereby requiring re-qualification if the composition of the shielding gas is changed.

The use of standards for the classification and designation of shielding gases is not widely used in South Africa. Manufacturers and users of these consumables are therefore encouraged to implement ISO 14175 in the market place in accordance to international practices.

Qualification and Certification

CONGRATULATIONS TO THE PEOPLE BELOW WHO RECENTLY ACHIEVED QUALIFICATION AND CERTIFICATION.

SAQCC-NDT CERTIFICATES

Liquid Penetrant Testing Level One

Anthony MY
Baloyi NC
Barnard AR
Bruwer R
Campbell IR
De Jager E
Dlodlo TP
Gqeba WT
Khanye A
Khumalo MS
Lefakane EK
Maboka LM
Mapaya MM
Marebane RE
Matjiu LG
Mkwanazi AS
Mnguni SB
Moselakgomo MC
Ndlovu G
Petersen LN
Potgieter AE
Ryan JA
Skosana JV
Supra PH
Van Niekerk N
Viljoen AJ
Voges SJ
Wucherpfennig GH

Liquid Penetrant Testing Level Two

Anderson DM
Baloyi DS
Buys B
Coetzee JW
Combrink H
Ebrahim MW
Fredericks MI
Loots JGI
Makarabwe S
Mamabolo MS
Manyuha J
Motshweneng LG
Naidu R
Plaatjies E
Ryklief I
Sigudu SJ
Sithole NC
Smit JA
Smith Q
Titus EG
Van Wyk R
Viviers RP
Weldon T

Liquid Penetrant Testing Level Three

Boshoff M
Chiswo A
Purcell M

Magnetic Particle Testing Level One

Anthony MY
Barnard AR
Bessenger LAF
Birkholtz J
Brown LL
Campbell IR
Chauke HW
Cilliers G
Dladla TMG
Dyantyii SV
Gqeba WT
Herbst NC
Kabini LG
Khoza M
Leal FL
Lefakane EK
Maddocks F
Magwaza NM
Mashiloane LT
Matjiu LG
Matlala KA
Mbatha SE
Mogola AN
Moodley S
Mthombeni NE
Petersen LN
Pienaar JP
Rafopa JL
Reghardt R
Scheepers L
Schutte W
Skosana JV
Skosana MB
Smit HC
Supra PH
Van Beek J
Van Den Berg DH
van den Berg WD
Van Niekerk N
Walgenbach MA
Wucherpfennig GH
Xulu SS

Magnetic Particle Testing Level Two

Anderson DM
Aspeling AR
Buys B
Cooper RL
De Bruyn RG
Grimsdell MG
Kumah GK
Loots JGI
Makarabwe S
Mamabolo MS
Manyuha J
Motukisi E
Moyo J
Naidu R
Ndlovu G
Ndlovu T
Nkosi SS
Nzimande TL
Plaatjies E
Ryklief I
Sifunda WS
Sithole NC
Van Rooyen JJP
Van Wyk HLL
Venter JF
Viviers RP
Weldon T
Winterbach JC
Zwane LN

Magnetic Particle Testing Level Three

Boshoff MP

Ultrasonic Testing Level One

Alberts GH
Coetzee JW
Dindikazi SC
Duma MG
Jozi T
Kekana NF
Mahlangu TA
Maritz W
Mnisi A
Moss SR
Secondo D
Van Hansen JE
Winterbach JC

Ultrasonic Testing Level Two

Brown LL
Digby J
Du Raan A
Haarhoff JC
Mashabane D
Mitchell JP
Naidu R
Nkosi SS
Smith Q
Van Der Berg PJ

Ultrasonic Testing Level Three

Purcell M

Ultrasonic Testing Wall Thickness

Aditsela RLM
Bannister MA
Cavernelius CA
Chauke P
Cooper RL
Denge V
Dhlamini MIC
Dube SJM
Gavhi M
Goldie B
Khoza S
King BD
Le Roux RP
Ledwaba SM
Luti B
Mabunda TC
Magolego ME
Majapelo RC
Makabate PA
Maseko RB
Mashamba MC
Masithhela TS
Matwasa SE
Meth SR
Mocumi L
Molala PM
Motsoeneng SR
Mtshwene TJ
Nekhubvi DC
Nkabinde Y
Nong C
Peerbhay F
Petersen B
Rakgalakane HS
Ramadi D
Rankowe T
Schutte W
Sithole TF
Skosana L
Tshabalala TTV
Tshikalange S
Tsolane BD
Van der Merwe A
Van Niekerk B
Venter PJS
Wearne D
Wilson RC

Radiographic Testing Level One

Du Plooy DW
Du Plooy V
Mahlangu BE
Pienaar JO
Pretorius JH
Stolls T

Radiographic Testing Level Two

Bowman WD
Buys B
Haarhoff JC
Lee J
Phetla BEZ
Van Hansen JE
Van Rooyen HF

Radiographic Testing Level Three

Boshoff M

Radiographic Interpreters

Campbell IR
Forbay RD
Klaasens AWP
Merrick LPA
Mngomezulu EM
Naidoo GD
Nel L
Norris LA
Sabapathy K
Wepener AH

Visual Testing Level One

Baloyi R
Bessenger LAF
Mbundwini MI
Mokoana P
Ntuli PS

Visual Testing Level Two

Baloyi R
Bessenger LAF
Mbundwini MI
Mokoana P
Ntuli PS

STUDENTS THAT PASSED THE BASICS OF WELDING QUALITY CONTROL

Ajodah A
Bard L
Bassai I
Bierman DJ
Chauke NH
Chetty K
Chibi SD
Coetzee SC
Craig GW
Crowie CW
Cubayi Q
Damons DJ
Dlamini C
Dlamini KE
Ferguson J
Forbay KL
George LC
Gerber SDD
Gould CI
Grewan DEJ
Gumede NN
Gwesu WW
Hasan van Wyk EI
Herbst KR
Jacobs D
Jonker PR
Joubert JP
Kayani FA
Kayter KL
Kotze GR
Krugel SW
Labuschagne JC
Loganathan AR
Lourens PJ
Lubisi N
Maddocks F
Madida S
Mahlalela S
Mahlangu SB
Mahomed Z
Makume SD
Malinga SA
Mashele AC
Maswikaneng C
Mathane R
Mathumbu RM
Matjie TP
Mavundla BM
Mbonani MV
Mdhlovu WM
Mdlalose KA
Mdletshe NC
Mkhwanazi SS
Mnguni PP
Mnyakeni SM
Mofokeng MJ
Mokoena JP
Mokwena LC
Molimo T
Motadi SR
Mothibeli M
Mtweni LM
Mzelemu NM
Nelson JW
Ngubane MB
Nhantsi S
Nhlapo LNL
Nkosi EG
Ntimane BJ
Ntshalintshali SF
Ntuli S
Ogle KBB
Olien R
Paul TP
Petersen S
Pita MEA

Pretorius MG
Rafael BS
Raman R
Rapotu ML
Robinson LMM
Roskruge BP
Salimo HTT
Selepe H
Sengo EMT
Shabangu NM
Shangisa VS
Shepherd M
Sibeko SF
Simmer KB
Smit JP
Smith H
Smith JL
Smith WH
Stoffels JD
Tsinini NP
Van der Linde AJ
Van der Schyff CL
Van Wyk PC
Verster AH
Visagie ACT
Walters RA
Wedemeyer C
Wiese JS
Williamson JM
Young C

STUDENTS THAT PASSED THE WELDING INSPECTORS LEVEL ONE & TWO

Inspectors Level One

Abdool Kader MZ
Abrahams PF
Adam N
Adams LO
Arantes CADCV
Augustine KA
Awala PE
Booysen GL
Bota VL
Botha FC
Brits PF
Britz L
Chipango F
Claasen H
Clarence D
Coetzee SS
Corneil H
Craig GW
De Kock J
Dlangamandla LP
Drude AV
Dunn TN
Engelbrecht BT
Fry FA
Fynn RA
Gough MS
Gould CI
Green J
Griqua XBR
Hanekom CJ
Hawthorn SA
Hlophe SW
Hoosen I
Hughes MG
Jacobs F
James CL
Janse van Rensburg MJ
Joubert JP
Katley JCW
Kerriem S
Khan Y
Khanye TW
Khumalo BP
Khumalo E
Kikia ED
Krugel SW
Kubvoruno T
Lamalattie KJ
Landsberg AW
Lebogo CD
Legrange GJ
Lloyd ND
Lukhele NXF
Lupke MMW
Maboho GT
Mabone LA
Mafuyeka MJ
Magagula S
Mahlangu SGF
Maloka T
Manenti G
Mangcu M
Manuel AG
Mashayamombe M
Masilela ML
Masombuka NP
Mathane RM
Matlabo SE
Mayisela DN
Mboweni NB
Mcnicol CD
Mgaga TE
Mgidlana BG
Mkhize MW
Mnguni BP
Mnikathi V
Mnyakeni SM
Moeketsi JT
Mogola TM
Mohale C
Mokoena FS
Mokoena MD
Morota PC
Mosibi TB
Motsoeneng TM
Mouton J
Moyo M
Mthimkulu KX
Mtsweni FM
Mtsweni SS
Mudoti SJ
Nemaheni AD
Newhoff GM
Ngubane S
Nhlapo MD
Nkoli PC
Nkosi VH
Nxumalo BG
Nyakale T
Olivier J
Orban CRDW
Patana M
Peters CJ
Petersen S
Pillay TT
Pretorius BJ
Prins D
Prinsloo TB
Roshan MZ
Rossouw PA
Samuel S
Schepers JA
Scott ZA
Setladi VH
Sikhosana OE
Siqiti LL
Sithole MT
Skhosane BS
Smit H
Smith LA
Smith MA
Snyders JD
Soobryan K
Sookrim A
Steenkamp GC
Stuart LM
Thomas MA
Thompson GL
Thompson JC
Tlou MGP
Van der Byl AC
Van der Byl GC
Van der Linde AJ
Van der Merwe CI
Van Leeve JRA
Van Niekerk N
Van Nikerk GJ
Van Rooyen FA
Van Zyl M
Venter HH
Venter QMA
Visagie ZV
Vorster RHG
Wajuba YC
Walters RA
White RS
Wiese JS
Williams BC
Williams JM
Wilson A
Young C

Inspectors Level Two

Adams Z
Allie K
August CA
Barends S
Baruti A
Benjamin W
Berry EM
Bessenger LAF
Bester R
Biggaers S
Botha DC
Botha Z
Bridger SL
Buntting JT
Cayzer PA
Chetty T
Chiweshe W
Dlamini T
Donnelly AJ
Du Plooy K
Du Toit Z
Els NP
Fereira R
Golden A
Goliath M
Gounden D
Gumede N
Hendricks DA
Hennings GJ
Hlongwane SC
Jacks RK
Jean-Pierre NM
Jooste BH
Joubert C
Kambarran DA
Katzke JR
Khumalo BH
Kotzee RL
Kriel J
Kruger G
Lepelle SE
Louis LR
Louw DF
Lucas E
Mabina PS
Mabuza SS
Madide TLS
Maelane MK
Mahlangu S
Mahomed AS
Majadibodu MC
Maleka LH
Manique B
Masemula P
Masete PL
Mathee M
Mbire N
Mei LA
Motoko A
Mpembe TP
Mthimkulu JM
Muhammad K
Naidu A
Ncongwane PR
Ndaba AA
Ndhlovu K
Nelson D
Nelson PJ
Ngwenya SH
Nhantsi T
Olckers J
Olivier HJ
Oosthuizen NJ
Padayachee T
Paul D
Petersen PJ
Pomone E
Qebengu TJ
Qurban H
Radebe SV
Rademan MPJ
Ramburran B
Reinhardt RRR
September CJ
Serabane MJ
Sibanda D
Sim T
Smith KP
Smith KR
Snyman AA
Sookrim A
Stevens AC
Steyn DJ
Stork KKB
Strachan JJ
Tan K
Van Aardt W
Van Blerk D
Van der Walt D
Van der Westhuizen M
Van Niekerk C
Van Schalkwyk CEJ
Van Schalkwyk RC
Viljoen J
Viviers R
Wagner C
Wessels J
Williams S
Wilson LCM
Wulff R
Wyngard RK

ASME Codes of Manufacture

Ajudhiya K
Barnard AR
Chhana KD
Galvao LL
Krause AJ
Lloyd AK
Mbele MP
Mbele TP
Morrow A
Nascimento VM
Resola RR
Shaw CEL
Sloan LL
Steyn DC
Xaba NPN

Painting Inspectors

De Villiers AP
Diago JL
Dubazana SL
Hendriks VW
Jean Pierre JB
Johnson GL
Mahomed Z
Makotore L
Mbopha SS
Mtsweni SV
Schoeman WJR

Heat Treatment

Coetzee W
Mavulule NS
Kubheka NM

CERTIFIED STUDENTS

Boilers

Dippenaar MC
Singh N

Pressure Vessels

Esterhuizen ES
Mashinini ME
Morck K
Qebengu TJ
Seconds C
Van Niekerk DG
Zungu T

IPE

Doyle E
Manuel GC
Mashilwane T
Oosthuizen JC
Van Wyk AS

SAIW NOTICE BOARD

Welcome to Riaan Loots

The SAIW welcomes Riaan Loots into the position of Senior Welding Consultant. Prior to his joining the SAIW, Riaan, a highly qualified Welding Engineer, was at the University of Pretoria where he lectured at the SAIW Centre for welding engineering.

In fact, the UP was where he began in 1997 with his B. Eng (Metallurgical Engineering) going on to do his Masters (ME) in 2003 and then his Honours (ME option: Welding Engineering) in 2012.

Riaan's task will be to consult clients on their welding needs. "So many SAIW members and others need advice and guidance on a host of welding issues and I look forward to being of service to them," says Riaan.

The good news is that they'll be in the best possible hands!

Good Luck Riaan in your new position.

Goodbye to Shilla Seleke – a legend at SAIW

Shilla Seleke is a veritable legend at the SAIW. Employed here for 30 years Shilla has worked in almost every department including cleaning, reception work, purchasing duties, looking after the grocery stocks for the students and really anything that has been asked of her. Shilla has been one of those indispensable figures around the SAIW – a true behind the scene hero and a unique character to boot!

Shilla says she has loved her work. Starting at the time of Chris Smallbone through to Jim Guild and now Sean Blake, Shilla has witnessed the growth of this incredible organisation.

Shilla has been married to Sipho Seleke for 40 years and has two children, Quinton (34) and Kamongelo (17).

After many years of devoted service Shilla has retired and will leave the Institute on August 31st. We wish her all the best and thank her for her devoted and spirited service to the Institute.

Understanding the importance of ISO 3834

Eriger Welding, manufacturer of steam boiler headers and turbine components, high pressure piping systems and fabricator of general structures for the Power Generation and Petrochemical Industries, has achieved ISO 3834 certification. Herman Potgieter CEO of SAIW Certification, the company through which ISO 3834 certification is administered, says that Eriger is one of many companies that understands the importance of this certification. "It is the ultimate recognition of the quality of the fabricator's work," he says.

From left: Eriger Welding's Gert Potgieter, Jannie Visser, Johan van der Merwe

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