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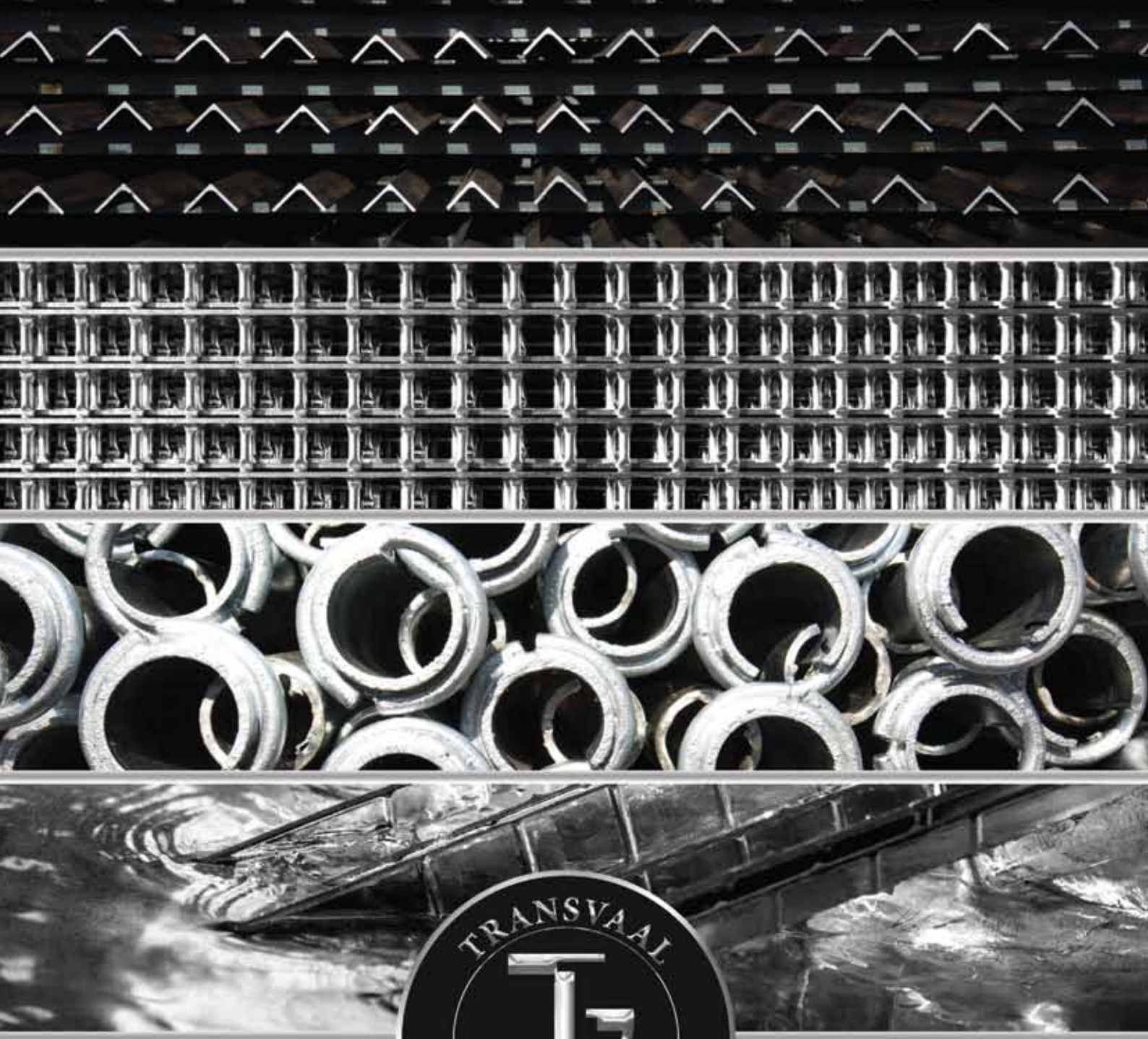
HOT DIP GALVANIZING TODAY 72

The Official Publication of the Hot Dip Galvanizers Association Southern Africa

CORROSION CONTROL OF STEEL



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EXECUTIVE DIRECTOR'S Comment

It is common knowledge that over 60% of all zinc mined, is utilized for corrosion control. The application of zinc for corrosion control is most prevalent through the galvanizing process. Zinc protects carbon steel and iron components in two ways. Firstly zinc forms a slowly corroding barrier which interacts with the environment and secondly if the barrier should be damaged the zinc coating provides cathodic protection to the steel or iron substrate. This places zinc coatings at an advantage over other coatings which generally only offer barrier protection.

A frequently asked question is; how thick a coating will the galvanizing process produce?

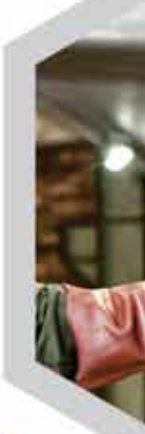
There are very broadly speaking two methods of galvanizing. The "wiping" process is frequently used for products such as wire or sheeting. Here products run through a molten zinc bath at relatively high speed and on exit have unreacted zinc blown off the product. This controls the thickness of the coating. It must be emphasised that these processes are finely controlled and products are produced to close tolerances and standards. Standards exist for each of these products. As an example there are two separate SANS standards that deal with wire. These standards stipulate coating thicknesses required for various grades of wire. Likewise galvanized sheeting has two SANS standards of consequence. Again coating thicknesses are specified for various grades and in one standard formability criteria is stipulated.

It is important, particularly for wiped products that the customer becomes familiar with the product grades and standards. Engineers, architects and fabricators too should be familiar with the standards to enable them to specify correctly for varied applications.

The general hot dip galvanizing method and its derivatives is used for batch dipping of steel and iron components or fabricated structures. This process entails the submergence of the cleaned iron or steel products in a zinc bath, held mostly, at a temperature of around 450°C. This triggers a metallurgical reaction between the molten zinc and steel which resulting in the formation of a coating comprising Zinc and zinc/iron alloys. In hot dip galvanizing, the primary influence on coating development and ultimate thickness is the reactivity levels of the steel. Without a full discussion on all the variables involved, the Silicon and Phosphorous contents are the prime determinants of reactivity. The galvanizer has a secondary role to play in control of coating thicknesses. These include – Angle of jigging and speed of withdrawal from the kettle to ensure effective runoff of unreacted zinc and time of submergence in the kettle. Again very specific SANS standards exist for coating appearance and coating thicknesses for products galvanized in this way. Note that since galvanizing is a reaction between molten zinc and steel, the term "Cold Galvanizing" should be avoided.

This issues rather technical "comment" section is written as a reminder to our readership of the importance of specifying, purchasing and receiving goods and materials compliant with the appropriate standards. Economic pressures, coupled to a degree, with loosening regulatory controls have opened avenues for the sale and distribution of many products which, at best, are not clearly marked or at worse are incorrectly represented.

The Association is able to assist with a full understanding of the technologies and standards involved in galvanizing. Excellent literature such as our "Facts about hot dip galvanizing" and "Steel protection guide" is available as reference documents from our office. Moreover the one as well as three day training courses are ideal for gaining a comprehensive understanding of the these matters and carry the benefit of being accredited for CPD points.



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EDITORIAL COMMENT
in this issue

In this issue a focus on water and its storage provides the reader with a starting point for setting the future management of this essential element of life and industry as a key factor for the future. Water is becoming more important by the day. The means and capacity to manage this vital resource remains a key challenge to the globe and to South Africa in particular. With relatively small rivers providing an ever increasing need to provide potable water for communities both in urban and rural environments the storage and delivery of this precious resource is paramount. Gauteng is currently holding less than 70% capacity of water in all its dams. The need for onsite storage is growing daily.

Other topics covered include:

- International Corrosion Awareness Day, 24 April 2019. The focus on corrosion, its costs and ways of controlling the silent pervasive destroyer.
- Bridges for Prosperity in Rwanda – new design in galvanized steel.
- Guarantees and Warranties for hot dip galvanizing?
- Technology:
  - Coating thickness gauge – The Elcometer probe development.
  - Zinc thermal spray – an insight into metallizing.
- We report back on:
  - SAISC Market Development course – focussing for growth for challenging times
  - Corrisa Technical Evening - A View on the Development of the Galvanizing Industry in China.

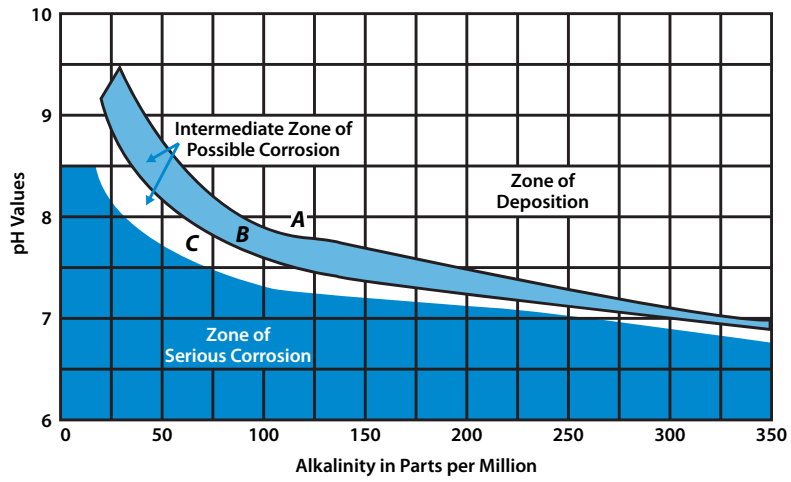
CORROSION and water

CORROSIVE WATER CAN DISSOLVE COMPONENTS OF ANY WATER STORAGE AND RETICULATION SYSTEM RESULTING IN INCIDENTS THAT UNDERMINE THE WATER'S STORAGE AND MAY ALSO IMPACT ON THE ECOSYSTEM IN WHICH IT IS BEING USED OR STORED.

Corrosive water will dissolve metals in the water's environment which will create both aesthetic and health-related challenges for storage and consumption.

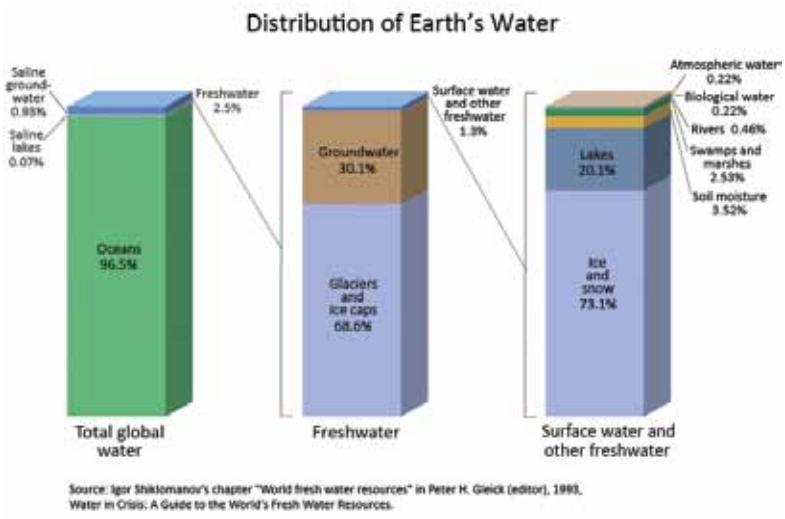
Traditionally corrosive water has affected the metals of plumbed systems. However corrosion of plastic PVC plumbing components will also result in dangerous amounts of vinyl chloride in water rendering it other than potable water. This occurs when plastic piping, not specifically approved for drinking water systems, has been used.

It may be obvious that a water system is affected by corrosive water. Tell-tale stains on sinks or basins, a metallic or plastic taste of the first water out of the tap, or small leaks in plumbing components are some readily discerned warning signs. More proactively, water testing can be used to measure the level of corrosivity of the water and to determine if metals and



Note:

A = Curve of values necessary to produce a coating of calcium carbonate.
B = Curve of calcium carbonate equilibrium
C = Curve of values necessary to prevent iron stains.



other compounds have gone into solution at levels above those specified in the applicable water standard.

Many characteristics of water determine its corrosivity. These include the pH, calcium concentration, hardness, dissolved solids content and temperature. Water that is "soft and acidic" (pH < 7.0) are seen to be more corrosive.

Generally, the accepted measures of water corrosivity are the stability or saturation indices derived from water analysis. These indices are determined from the chemical characteristics of the water, such as hardness and pH, to estimate the corrosiveness of the water.

The Langelier Saturation Index (LSI) is the most common. Negative values of the LSI indicate corrosive water while positive results indicate non-corrosive water. Another common index is the Ryzner Stability Index or RSI. A RSI greater than about 6.5 indicates water that is less stable in employing the $CaCo_3$ to provide the carbonates needed for corrosion control, with higher values reflecting increasing corrosivity of the water.

Water treatment to reduce corrosivity

Treatment units such as neutralizing filters or chemical feed systems can be installed to reduce water corrosivity by adding alkaline chemicals to the water. Since corrosion affects the entire plumbed system, these treatment devices are typically installed where the water enters the storage facility before being reticulated to various outlets.

Corrosivity may be treated by injecting a sodium hydroxide or soda ash solution by using a chemical feed pump before the pressure tank. This type of treatment system is simple, less expensive and does not increase water's hardness. As such it is normally installed ahead of the pressure tank and there is no reduction in water pressure which may occur with neutralizing filters. This process requires significant maintenance including filling the solution tanks and maintaining the feed pump. Soda ash is preferred over sodium hydroxide because it is safer to handle. Sodium hydroxide is extremely caustic and must be handled using accepted safety practices.

Acid neutralizing filters are also simple water treatment units intended to increase pH and add calcium to decrease the water's corrosivity. A simple such system consists of a tank filled with calcium carbonate ($CaCo_3$) or limestone chips, marble chips, magnesium oxide, or other alkaline material. Such an acid neutralizing filter is usually installed after the pressure tank. Raw water passes through the tank and contacts the media, the pH is increased and subsequently corrosivity decreased. It is important to note that this process increases the hardness of the water which is necessary for proper corrosion control. The increase in resistance of the water containing neutralizing material may lower water pressure. Frequent maintenance is required for neutralizing filters. The tank must be routinely refilled with neutralizing material as it is dissolved. The rate of refilling can range from weeks to months depending on the raw water corrosivity, water use, and the type of neutralizing material. Backwashing is recommended to remove trapped particles and oxidized metals unless a separate sediment filter is installed ahead of the unit just prior to entering the final potable water storage facility. The corrosivity of water has become more of a challenge as our ever reducing potable water reserves continue to be affected by pollution and incidental chemical infusion.

The need to store potable water, to lower the maintenance costs of water reticulation systems and provide decentralised storage has seen a resurgence of the 'Braithwaite' type galvanized steel water storage tank. No new comer. These types of tanks have been in service since the turn of the last century. The tanks are easy to install and operate with erection time being a clear-cut benefit. As these units are modular in design, they can be tailored to the needs of the client and easily erected in most environments, from building roofs to rural applications where they can be mounted on support towers to improve water pressure.

EVALUATING HOT DIP GALVANIZED steel water storage tanks

The corrosion control of hot dip galvanized steel water storage tanks is multi-variable driven. Both corrosion due to atmospheric environmental parameters as well as the water's own parameters need to be determined. The exterior of the hot dip galvanized steel water storage tank will be subjected to atmospheric conditions while the interior will be primarily subject to water conditions.

Atmospheric parameters are easier to discern and are able to be classified according to standards such as ISO 9223. The contents and composition of the stored water will need to be laboratory analysed.

The principle evaluation of water corrosivity is based on the determination of two indices viz. The Langelier Index and the Ryznar Index. To determine these indices several values related to the water's content and chemical composition are needed.

These include:

Operating Temperature	°C
pH	–
Conductivity	mS/cm
Totally dissolved solids TDS	mg/l
Chlorides as Cl	mg/l
Sulphates as SO_4	mg/l
Alkalinity as $CaCO_3$	mg/l
Calcium Hardness as Ca	mg/l
Calcium Hardness as $CaCO_3$	mg/l
Suspended Solids	mg/l
Total Hardness as $CaCO_3$	mg/l
Iron as Fe	mg/l

It is recognized that 'typical' analysis of water is conducted to determine the water's suitability in terms of potable water parameters for safe human consumption. Corrosivity analysis is to determine the effect of the water on the structure. While the two analyses share parameters all the parameters need to be analysed to ensure effective storage of the potable water is achieved.

Additionally the natures of the water utilization, which may vary from being low flow with high periods of storage to continuous flow of water between low tank level and high tank level with little to no periods of water standing, are also important.

Water source conditions and chemical variations, from each source including the water treatment prior to storage also have roles to play in the longevity of the corrosion control of the storage tank. Regular evaluation of these parameters over the lifespan of the tank is prudent.

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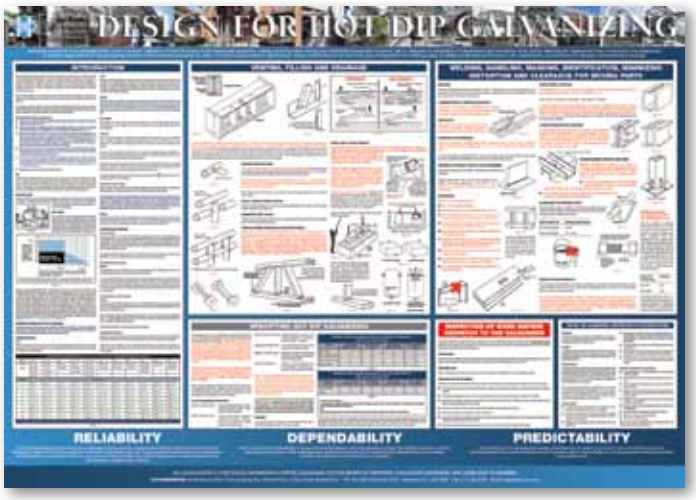
DESIGN FOR HOT DIP GALVANIZING WALL CHART

The **wallchart** is an invaluable reference chart for fabricators and specifiers. Key information is readily available to allow for best engineering practice for galvanizing.



TECHNICAL GUIDES

The HDGASA **Steel Protection Guide** and **Facts about Hot Dip Galvanizing** are available in high-gloss printed material for reference and guidance.

HOT DIP GALVANIZERS ASSOCIATION SOUTHERN AFRICA

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BUSINESS DEVELOPMENT – key to continued growth

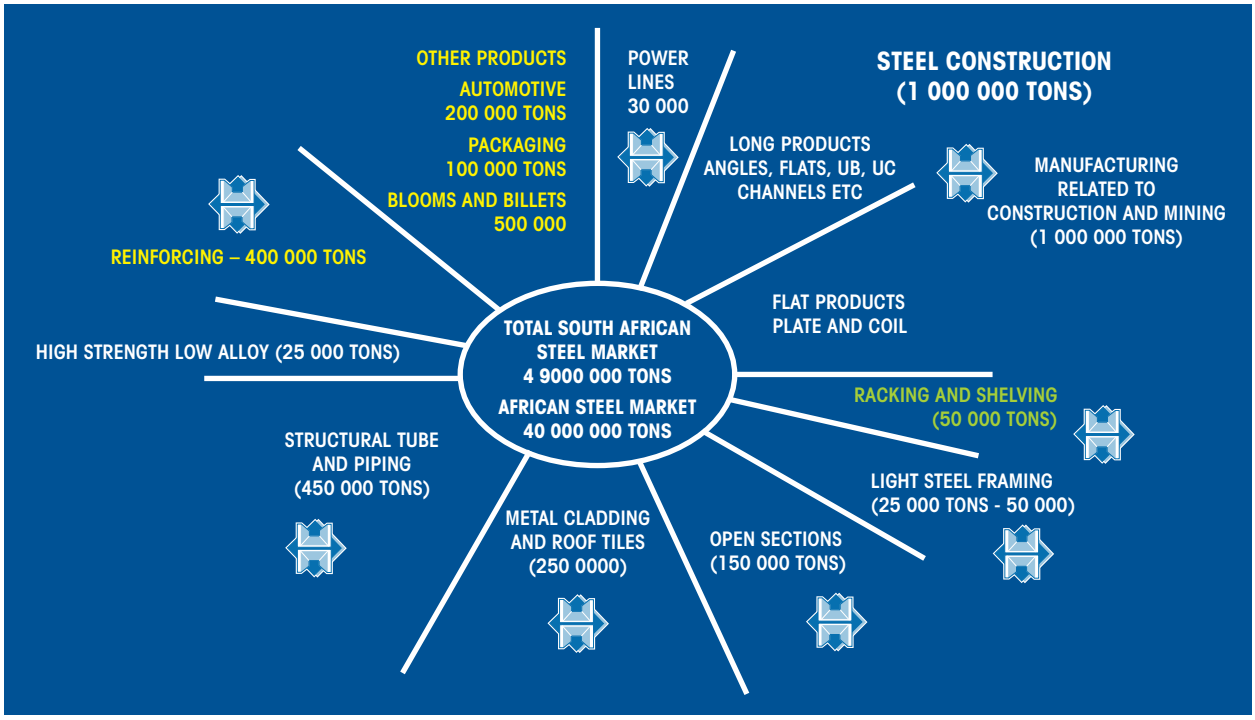
THE HOT DIP GALVANIZERS ASSOCIATION SOUTHERN AFRICA ATTENDED THE SAISC BUSINESS DEVELOPMENT IN THE STEEL INDUSTRY COURSE IN FEBRUARY 2019.

"We are well aware of the state of our industry, but we must not forget its abilities and potential, its skills base and its ability to recover and grow" says Paolo Trinchero as he kicked off the course. Steel construction across the various product groupings totals approximately 4 900 000 tons of steel in the African steel market of some 40 000 000 tons. The steel construction sector accounts for around 1 000 000 tons with rebar providing another 400 000 tons a year. Hot dip galvanizing is a downstream player in the market for both steel construction and rebar.

Market development is the key to maintaining any businesses growth. From evaluation of competitive offerings to understanding and networking with the key decision makers in your industry this discipline is a must in today's challenging economy.

The course, held over two weeks at the SAISC offices in Johannesburg, covered:

- Introduction to the Steel Industry (Global and Local)
- The Supply Chain and the Value Chain
- Market Sectors and the Client
- Marketing and Business Development Strategy
- Market Intelligence and Analysis
- Key Account Management
- The Role of Networking



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STATE-OF-THE-ART SCANNING PROBES speed up the coating thickness inspection task

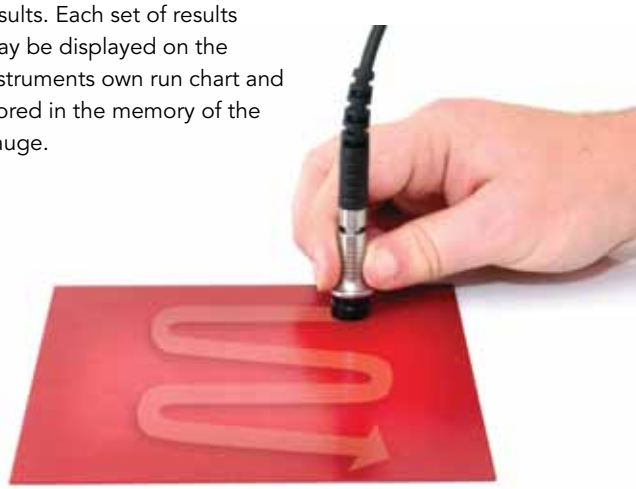
WHEN INSPECTING A COATED SURFACE TO ENSURE COMPLIANCE WITH THE STANDARD AND SPECIFICATION IT IS IMPORTANT THAT THE INSPECTION IS CARRIED OUT SPEEDILY AND ACCURATELY. SHOULD REWORK BE REQUIRED IT NEEDS TO BE CARRIED OUT IN A MANNER THAT DOES NOT DELAY THE COMPLETION OF THE PROCESS.

Elcometer has introduced a range of state-of-the-art scanning probes as options for the very popular ***Elcometer 456*** Coating Thickness Gauge. The swiftness of inspection is greatly assisted when using these latest ***Elcometer 456 Ultra/Scan probes***. Through contact and dragging these probes allow for large areas to be rapidly assessed.

The new ***Ultra Scan Probe*** comes fitted with a 'snap on' replaceable end cap so that the sliding action of the scanning technique across the measured surface does not result in direct wear to the metal tip of the probe. The Ultra Scan probes use the ***Elcometer 456's*** patented offset feature to ensure that the thickness of the cap is included in the calibration adjustment process. Furthermore, as the cap wears during use, this wear will be accounted for. The gauge displays a warning message when the cap thickness reaches a level where the cap must be replaced.

The firmware for the ***Elcometer 456*** Separate gauge, Top (T) version, has been improved to allow the ***Ultra Scan Probe*** to be used and to operate in either the *'Scan Mode'* or *'Auto Repeat Mode'*.

In *'Scan Mode'* the probe can slide over the surface of the coating. As the probe is lifted, the gauge displays the results. Each set of results may be displayed on the instruments own run chart and stored in the memory of the gauge.



1 The Ultra Scan Probe with replaceable end caps for increased durability.

In *'Auto Repeat Mode'* a reading is taken approximately every 0.5 seconds as the probe is slid across the surface and each individual reading is stored in the memory of the gauge. With a reading rate in excess of 140 readings per minute the *'Auto Repeat Mode'* significantly reduces the inspection time for large coated areas being evaluated.

The reporting process is greatly assisted by the ***ElcoMaster™ 2.0*** data management software with the harvested data being downloaded to a computer either directly (USB) or wirelessly (Bluetooth).

Suitable for Cloud Computing the data can easily be transferred via the Internet using the ***ElcoMaster™ for Android*** mobile app on a smart phone or a tablet. By using Cloud Computing the exchange of data across sites, countries and even between continents is achieved simply and quickly. When using an Android mobile phone the option for recording the location of the inspection site using the GPS App and tagging the batch locations in ***ElcoMaster™ 2.0*** is an additional useful feature.

Ultimately the E***lcometer 456, Elcometer Ultra Scan Probes, ElcoMaster 2.0*** and ***ElcoMaster for Android*** are a team ready to provide professional, repeatable and easily reportable validation of coating thickness's required for universal quality control and assurance in today's fast paced demanding market.

2 The Elcometer 456 showing the Run Chart display.

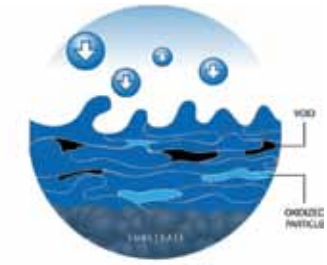
2

INTERNATIONAL
Corrosion Awareness Day

Corrosion affects everything from the design of our currency to the composition of our tap water, and it will determine the legacy we leave on this planet. This exploration of corrosion, and the incredible lengths we go to fight it is a fascinating and important subject. It has been called the great destroyer. A pervasive menace, corrosion destroys cars, fells bridges, sinks ships, sparks house fires, and nearly brought down the Statue of Liberty. Global corrosion costs amount to an astounding R35 trillion, more than all other natural disasters combined.

The potential to reduce the loss due to corrosion by R 12 trillion annually through appropriate application of existing corrosion abatement technologies is readily achievable through access to and use of highly experienced corrosion professionals, harmonizing standards, along with continuing education and training all underpinned by promoting greater corrosion awareness.

The Hot Dip Galvanizers Association Southern Africa (HDGASA) together with METALSPRAY, were sponsored by the International Zinc Association (IZA), to host a stand at the Corrisa 2019 International Corrosion Day event. Corrosion Awareness Day highlights corrosion worldwide which consumes between 3 to 4% of GDP of industrialized countries. The day was set aside to inform many decision-makers in industry and government of the consequences of corrosion and how critical it is to control it.



THERMAL SPRAY and corrosion control

Thermal Spraying is not a new process. It has proven itself to be extremely effective in the 90 years of its existence in all manner of applications. Metal or thermal spraying is a technology, which protects and greatly extends the life of a wide variety of products in the most hostile environments and in situations where coatings are vital for longevity. Metal spraying is a very flexible process.

The range or materials that can be sprayed is almost limitless. In effect, if a material can be heated to its melting point without boiling away, the material can be sprayed. In this article we focus on corrosion control finishing. Metal spraying is carried out in a wide range of environments including oil and gas, construction, petrochemical and marine.

Thermal spraying involves the projection of small molten particles onto a prepared surface where they adhere and form a continuous coating. To create the molten particles, a heat source, a spray material and an atomisation/projection

method are required. Upon contact, the particles flatten onto the surface, freeze and mechanically bond, firstly onto the roughened substrate and then onto each other as the coating thickness is increased. In thermal spraying flamespray and arcspray are normally used for finishing coatings.

The wire flame process is typically used for most corrosion control coatings; a wire (e.g. zinc) is fed by a driven roller system through the centre of an oxygen-propane flame where it is melted. An annular air nozzle then applies a jet of high-pressure air, which atomises and projects the molten material onto the work piece. The driving of the wire is typically via an air motor and gearbox that forms part of the pistol. Wire is typically dispensed from coils or production packs (drums).

As the heat energy in the molten particles is small relative to the size of the sprayed component, the process imparts very little heat to the substrate. As the increased heat load of the coated parts is minimal, heat distortion is not normally experienced.

The process is transportable, so thermal spray finishing can be applied on-site or used for repairs where on-site welding has, for example, denuded the galvanizing. International and European standard EN ISO 2063-1:2017 is recommended for thermal spray applications for corrosion control coatings.

The HDGASA endorses zinc thermal spray as the preferred renovation technology for hot dip galvanized articles in line with SANS 121: 2011 (ISO 1461:2009) – 6.3 Renovation.

GUARANTEES AND WARRANTIES
for hot dip galvanized materials

Original text by Mr Mike Book sub-edited by HDGASA

Guarantees and warranties are documents drafted by legal experts outlining the outcomes in the event that a specific failure occurs, but offer no substance to the success or failure of the specification's performance. A guarantee or warranty is not a reliable assurance of the performance of a product it merely specifies a recourse in the event of a failure.

The client, consultant or fabricator is in fact seeking assurances that the workmanship and materials will provide corrosion control for a given period of time under specified conditions. Reluctance on the part of the supplier to provide such guarantees is often perceived as a lack of confidence in the corrosion control system being applied.

The performance of a corrosion control solution requires properly engineered solutions. The correct engineering design and an accredited galvanizer's ability to execute the hot dip galvanizing of the material in accordance with a national or international standard are of greater weight than any 'promise' of a written guarantee or warranty.

It must be borne in mind that guarantees and warranties contain obligations that apply to both parties. The end user may be subject to onerous requirements that they themselves do not have the capacity to undertake. For example to conduct regular evaluation of and maintain records of the conditions under which the corrosion control system is to being used.

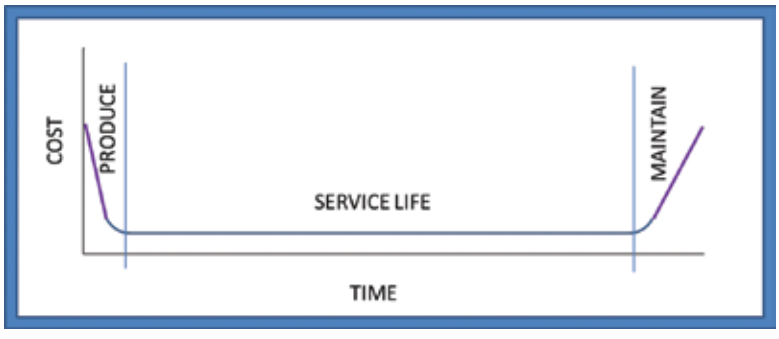
Liability under a guarantee is limited. The clients on accepting a guarantee or warranty accepts that there will be a limit on the value of repairs or compensation should a failure have deemed to have occurred prematurely. This maximum value will almost always be limited to the contract value, in this case applicable to the galvanizer, which is likely to be a nominal percentage of the entire project cost. Furthermore in long term instances liability will typically be of a reducing nature while at the same time costs will continue to escalate.

The local and international hot dip galvanizing industry has universally foregone the use of guarantees and warranties. Rather the determination of an expected service life in years of service prior to first maintenance has been adopted. To this end a number of factors are considered and relevant standards applied. These fundamentals are relevant in determining the effectiveness of the corrosion control system.

The first step is to determine the nature of the environment in which the material is to be used i.e. the intrinsic 'corrosivity' of the environment. For hot dip galvanizing the applicable standard used in this evaluation is *ISO 9223 Corrosion of metals and alloys – Corrosivity of atmospheres*

– Classification, determination and estimation. ISO 9223 provides a classification system for the corrosivity of atmospheric environments. The standard defines corrosivity categories for the atmospheric environments by the first-year corrosion rate of standard specimens, gives dose-response functions for normative estimation of the corrosivity category based on the calculated first-year corrosion loss of standard metals, and makes possible an informative estimation of the corrosivity category based on knowledge of the local environmental situation. Furthermore it specifies the key factors in the atmospheric corrosion of metals and alloys. These are the temperature-humidity complex, pollution by sulphur dioxide and airborne salinity.

The temperature-humidity complex can be evaluated in terms of time of wetness. Corrosion effects of other pollutants (ozone, nitrogen oxides and particulates) are not considered decisive in the assessment of corrosivity according to ISO 9223. The standard does not, however, characterize the corrosivity of specific service atmospheres, e.g. atmospheres in chemical or metallurgical industries.



Design considerations are paramount in ensuring a highly effective corrosion control system. As such the standard applicable to this stage of the project is *ISO 14713 Parts 1, 2 & 3: Zinc coatings Guidelines and recommendations for the protection against corrosion of iron and steel in structures.* This standard provides guidance on the chemical composition and the surface condition (finish and roughness) of the basis metal, the mass of the parts and the galvanizing conditions that may affect the appearance, thickness and texture and the physical/mechanical properties of the coating.

The accreditation, by a SANAS approved laboratory, of the hot dip galvanizer to the appropriate standard is a pre requisite to insuring that the hot dip galvanizing of the material has been done in accordance with the standard. In South Africa the national standard for batch or general hot dip galvanizing is *SANS 121: 2011 ed. 2 (ISO 1461: 2009 ed. 3) Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods.*

The HDGASA Information sheet: *Hot Dip Galvanized Information Sheet No.8 Corrosion of Zinc – Corrosivity of Atmospheres*, available at no cost on our website *(www.hdgasa.org.za)*, provides an explanation with supporting data as to how such an estimated service life can be reasonably determined.

In conclusion, the timespan of a guarantee is usually shorter than the expected service life of a hot dip galvanized coating. It is critical that at the outset the asset owner, project managers, suppliers, consultants and contractors agree that the specification will meet the designed durable life expectancy of the system.

GALVANIZED STEEL FOR
Bridges to Prosperity

By: Hazvinei Munjoma, hmunjoma@zinc.org, Sub edited by HDGASA

BRIDGES TO PROSPERITY ENVISIONS A WORLD WHERE POVERTY CAUSED BY RURAL ISOLATION NO LONGER EXISTS. CONNECTION IS THE CRITICAL FOUNDATION FOR ECONOMIC OPPORTUNITY, HEALTHCARE, AND EDUCATION. THROUGH CONNECTION, ECONOMIC OPPORTUNITY IS CREATED AND AVERAGE INCOME INCREASES. THE SAFE ACCESS PROVIDED BY THE BRIDGES UNLOCKS ECONOMIC OPPORTUNITY FOR A COMMUNITY. *BRIDGES TO PROSPERITY,* AN INTERNATIONAL NON-GOVERNMENTAL ORGANIZATION, HAS CONSTRUCTED OVER 300 FOOTBRIDGES GLOBALLY.

Rural local farmers can move out of their immediate surrounds to sell their crops at outside markets. They also gain easier access to agricultural inputs like fertilizer and seed. By networking a rural community is integrated to the world that was around them, they participate more effectively in the national and even in the global economy transforming the county's population as well as their local communities.

Typically bridges that, *Bridges to Prosperity* have constructed in Rwanda were constructed of painted steel crossbeams supporting a timber deck. The longevity and structural integrity require maintenance that may not be ideal in these rural settings. To increase the service life of the footbridges and ensure lower maintenance, *Bridges to Prosperity* investigated a new bridge design.

International networking and collaboration between the *HDGASA, American Galvanizing Association, MetalSpray* and the *International Zinc Association* with *Bridges to Prosperity* allowed for innovative solutions to be considered. The application of a zinc coating by way of hot dip galvanizing or zinc thermal spray

(metalizing) was a key consideration in regard to corrosion control of the steel.

Subsequently *Bridges to Prosperity* took a decision to proceed with a new steel based design. The steel design incorporates galvanized steel grating panels supported by galvanized steel crossbeams. The low maintenance and high structural integrity of using galvanized steel will provide for the bridge program to deliver consistently on its aim of safely connecting communities in rural environments.

Bridges to Prosperity has recently signed a MoU with the government of Rwanda to build in the order of 355 bridges over the next 5 years. Joined through steel protected by galvanizing, another step in the 4th Industrial Revolution in Africa is being forged.

Contact information: https://bridgestoprosperity.org/

CORRISA Technical Evening

The HDGASA attended The Corrosion Institute of Southern Africa's Technical Evening on the 14 March 2019. The topic of which was *"A View on the Development of the Galvanizing Industry in China (A 20 Year Journey)"* presented by Mr Rob White

Rob White, acting as a consultant to the USA based International Zinc Association, managed a United Nations funded project to develop and improve the hot dip galvanizing industry in China over a period of almost 20 years.

The challenges and changes over this period were presented and the role of the Chinese authorities in supporting the growth of the industry was discussed. The innovation of infrastructural development by the regime was a key foundation for the industry to grow and develop. From rudimentary beginnings as coal fired furnaces to environmentally responsible mega plants integrated into some of the globes largest manufacturing centres.

THE CORROSION INSTITUTE OF SOUTHERN AFRICA
COURSE SCHEDULE 2019

Introduction to Corrosion Engineering Course (5 days)

2nd – 6th September 2019	The CORē, Midrand
7th – 11th October 2019	CPT, venue to be confirmed

Corrosion Management (2days)

5th – 6th August 2019	The CORē, Midrand

Not Just Rust (Half day)

26th June 2019	The CORē, Midrand
28th August 2019	The CORē, Midrand
30th October 2019	The CORē, Midrand

NACE CIP 1 – Coating Inspector Program Level 1 (6 days)

6th – 11th May 2019	The CORē, Midrand
3rd – 8th June 2019	CPT, venue to be confirmed
8th – 13th July 2019	The CORē, Midrand
16th – 21st September 2019	The CORē, Midrand
4th – 9th November 2019	The CORē, Midrand

CITWI – Corrosion in the Water Industry (4 days)

20th – 23rd May 2019	The CORē, Midrand
18th – 21st November 2019	The CORē, Midrand

NACE CIP 2 – Coating Inspector Program Level 2 (6 days)

27th May – 1st June 2019	The CORē, Midrand
25th – 30th November 2019	The CORē, Midrand

NACE CIP 3 – Peer Review

On request – minimum 15 students Garden Court, Sandton

NACE CP 2 – Cathodic Protection Technician (5 days)

24th – 28th June 2019	The CORē, Midrand

NACE OCAT – Offshore Corrosion Assessment Training (5 days)

19th – 23rd August 2019	CPT, venue to be confirmed

NACE – Corrosion Control in the Refining Industry (5 days)

21st – 25th October 2019	The CORē, Midrand

NACE – Marine Technology (4 days)

22nd – 25th July 2019	The CORē, Midrand

NACE – Corrosion & Protection of Concrete Structures and Buildings (2 days)

27th – 28th May 2019	The CORē, Midrand

Any of the above courses can be presented at your premises, dependant on numbers. Courses with no dates can be requested through Linda.
Please contact Linda on +27 10 224 0761 or courses@corrisa.org.za for further information

"Knowledge is the only instrument of production that is not subject to diminishing returns" John Maurice Clark

COURSES OFFERED

Level I: Introduction to Hot Dip Galvanizing

The HDGASA one day INTRODUCTION TO HOT DIP GALVANIZING course is designed to provide an initial understanding of the concepts relating to hot dip galvanized coatings applied for corrosion control of steel components. The course comprises six modules. In order for the course to be viable we require six or more candidates to attend. Arrangements can also be made for this course to be held at a venue of your choosing for more than six candidates. In addition to the course, a special visit to a hot dip galvanizing plant may be arranged on a separate date, should six or more candidates be interested and able to attend.

Level II: Certified Galvanizing Inspectors

The HDGASA advanced Level II course provides the necessary skills to assess the quality and conformance of Hot Dip Galvanized coatings and Duplex Systems to the applicable specification. Delegates are introduced to other metallic type coating specifications and their application for corrosion control design.

The course provides an in-depth interpretation of the specifications and accepted best practice procedures for determining coating thickness, visual inspection of surface finishes as well as the evaluation of these coatings for corrosion control of steel components. The course includes a visit to a hot dip galvanizing plant where delegates will have an opportunity to assess finished product against the relevant quality standards on a real time first hand basis.

Three Continuous Professional Development (CPD) points are awarded to delegates attending the entire course. Bookings are limited to a maximum of 10 people, with applications treated on a first-come-first-serve basis. In order for the course to be viable we require 6 or more candidates to attend. Arrangements can also be made for the course to be held at a venue of your choice for more than 6 candidates.

ENROL IN A COURSE TODAY!
CALL Lara at 011 456 7960
EMAIL: hdgasa@icon.co.za

INCLUDES ELECTRONIC 'HDGASA INSPECTOR TOOLKIT'

HOT DIP GALVANIZERS ASSOCIATION SOUTHERN AFRICA

EDUCATION and training

LEVEL 11 ADVANCED INSPECTORS' COURSES ON HOT DIP GALVANIZING

The hot dip galvanizing (HDG) course was presented to two sets of delegates from the 9th to the 11th of April and again from the 14th to 16th May 2019. The three day course focussed on zinc and how it protects, the corrosive environments (ISO 9223 / ISO 12944), the HDG process, Duplex Systems, HDG rebar and Inspection, standards, methodology and certification of HDG articles.

The customized format allowed for maximum interaction with the delegates and ensured a high level of knowledge transfer. A plant tour ended the course with the delegates shown the workings and procedures of a modern HDG plant at ARMCO Isando's plant.

REFRESHER OPERATOR TRAINING

A series of tailored interactive courses for refresher training of personnel at ARMCO [Randfontein] were presented to OPERATORS by HDGASA Executive Director Robin Clarke. "Once again a positive and strong participation by the delegates ensured a course of excellent outcomes" said Robin.

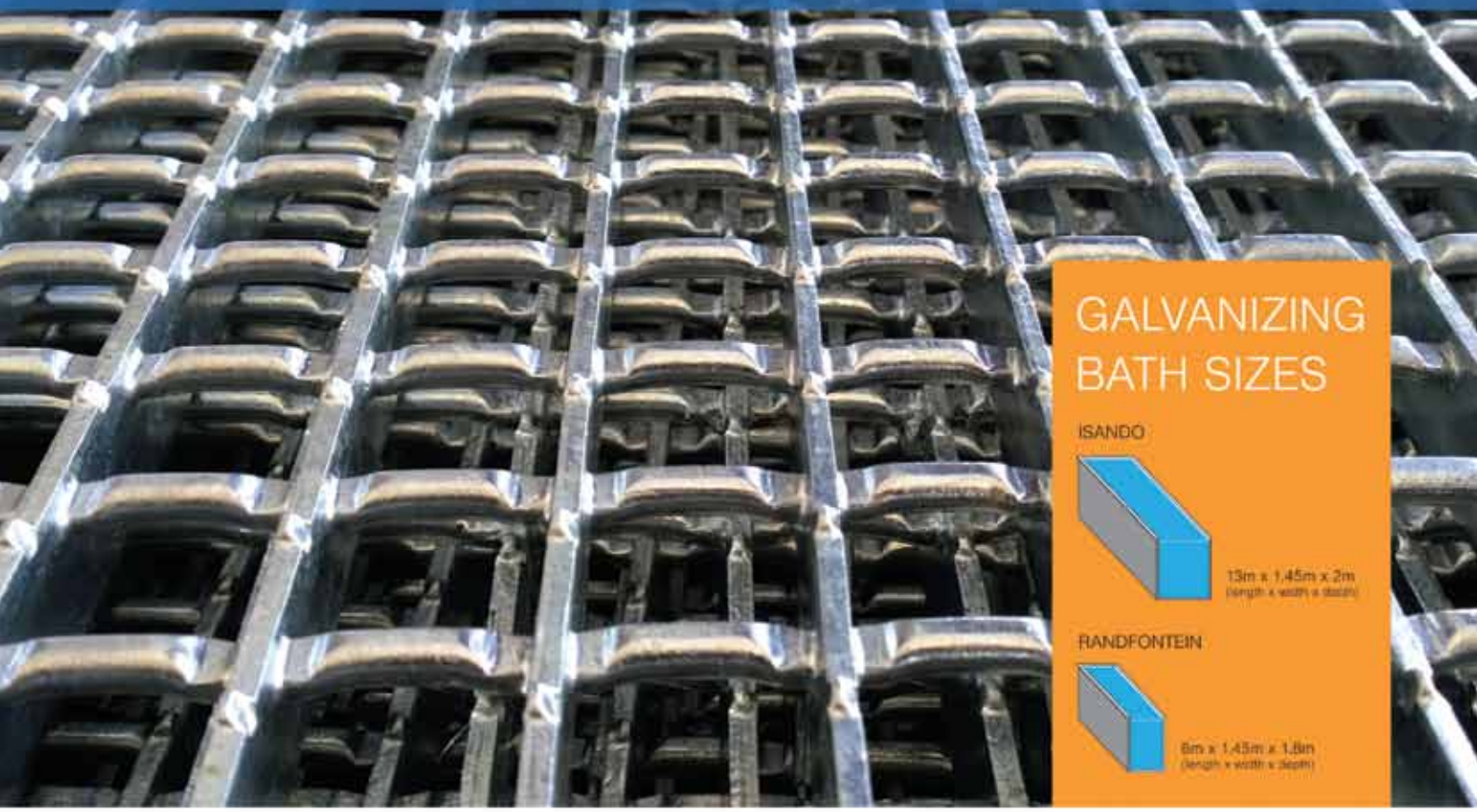
THE ASSOCIATION WOULD LIKE TO ACKNOWLEDGE THE ADVERTISERS AND THANK THEM FOR THEIR SUPPORT

HOT DIP GALVANIZING MEMBERS

GALVANIZER	LOCATION	TEL. NO	SPIN	NO. OF LINES	BATH SIZES (L x W x D) (m)
GAUTENG					
ArcelorMittal South Africa	Vanderbijlpark	016 889 9111		3	Sheet galvanizer
Armco Galvanizers	Isando	011 974 8511		1	13.2 x 1.5 x 2.2
Armco Galvanizers - Randfontein	Randfontein	011 693 5825		1	6.5 x 1.3 x 2.0
Galferro Galvanisers In-line and general	Springs	011 817 3667		4	13.5 x 1.65 x 2.5 6.8 x 0.9 x 1.4 6.5 x 0.9 x 1.5 6.45 x 0.755 x 0.9
Lianru Galvanisers cc	Nigel	011 814 8658		2	7.2 x 1.3 x 1.6 4.5 x 1.3 x 1.6
Pro-Tech Galvanizers (Pty) Ltd	Nigel	011 814 4292	•	2	3.2 x 1.1 x 1.5 3.0 x 1.1 x 1.2
Silverton Engineering	Silverton	012 843 8000		1	7.0 x 1.7 x 2.0
SMT Galvanizers	Benoni South	011 421 1495	•	2	2.6 x 1.0 x 1.5 2.0 x 1.0 x 1.5
Transvaal Galvanisers In-line and general	Nigel	011 814 1113		4	15.5 x 2.0 x 3.2 – 1 of 12.5 x 1.2 x 1.8 – 1 of 8.0 x 1.2 x 1.5 – 2 of
WESTERN CAPE					
Advanced Galvanising (Pty) Ltd	Bellville	021 951 6242		1	14.0 x 1.4 x 3.0
South Cape Galvanizing (Pty) Ltd	George Industria	044 884 0882		2	3.7 x 0.94 x 2.3
EASTERN CAPE					
Galvanising Techniques cc	Port Elizabeth	041 486 1432		1	12.0 x 1.3 x 2.3
Morhot (Pty) Ltd	East London	043 763 1143		1	7.0 x 2.5 x 1.5
KWAZULU/NATAL					
A&A Galvanisers	Pietermaritzburg	033 387 5783	•	1	3.8 x 0.9 x 1.8
Bay Galvanisers	Richards Bay	035 751 1942		1	5.0 x 1.2 x 2.5
Durban Galvanizing (Pty) Ltd	Briardene	031 563 7032		1	9.5 x 1.3 x 3.0
Phoenix Galvanizing (Pty) Ltd	Phoenix	031 500 1607	•	2	14.0 x 1.4 x 2.5 3.0 x 1.2 x 1.2
Pinetown Galvanizing	Pinetown	031 700 5599		1	9.0 x 1.2 x 3.0
INTERNATIONAL					
MAURITIUS					
Galvanising Co Ltd	Port Louis	+230 234 5118		1	7.0 x 0.75 x 1.68
ZIMBABWE					
Essar Tubes	Graniteside	+263772833477		1	10.0 x 1.1 x 1.0

- Sheet, wire, pipe and other in-line galvanizing members dedicate their plants to the galvanizing of their own products. The bath sizes are inside dimensions and not maximum component size. Kindly take note of the expansion of the component when dipped into molten zinc or discuss with relevant galvanizer.

HOT DIP GALVANIZING... THE **BEST PROTECTION!**



CONSISTENTLY DELIVERING SUPERIOR QUALITY GALVANIZED PRODUCTS TO ALL OUR CUSTOMERS

Armco Galvanizers Isando has been operating since 1989. Geared up to accommodate heavy structural steel up and till 13m in length. Isando has an average output of plus minus 2000 tons per month. With an improved lay down area and increased loading capacity by addition of a tower crane we strive to give "A" class service to all our customers big or small.

Armco Galvanizers Randfontein is our second facility based in the Randfontein area. Randfontein has an average output of plus minus 800 tons per month and is geared up to handle light to medium structural steel up and till 6m in length.

The company has it's own SANS 121 2000 ISO 1461 accredited Hot Dip Galvanizing plants. And is listed under the SABS ISO 9001 scheme.

Isando | **Tel.** +27 11 974 8511

Randfontein | **Tel.** +27 11 693 5825

Web. www.armco.co.za

ARMCO SUPERLITE

OBO Bettermann Group