Associate of International Zinc Association

64
galvanize
October 2006

Asia Pacific Edition
GALVANIZING IN ENGINEERING AND THE ENVIRONMENT

# GALVANIZED STEEL

## ENVIRONMENTAL SENSITIVITY AND PERFORMANCE

*Lake Vasto, Perth WA*

**In this issue**



**Editorial**
Emmanuel Pimentel

**Prepared by**
Galvanizers Association of Australia

Architectual engineering and landscape designers are great innovators. Innovative designs require materials and protection technologies that are versatile and sensitive to all environments, yet are durable and minimise the need for ongoing maintenance. After-fabrication hot dip galvanizing technology has been used to protect steel for over 170 years. In fact, hot dip galvanizing has been used to protect almost every type of steel structure and fabrication imaginable. In Australia, there are examples of hot dip galvanizing that have managed to survive in the harshest conditions for 130 years.

As our cities become denser and expand, the selection of materials for use in the built environment will require innovative and sensitive design that should not only be aesthetically pleasing, but will also need to withstand the rigours of everyday use by those in the community. Designers are beginning to appreciate the fact that galvanized steel is a material with superior corrosion resistance, abrasion resistance and environmentally friendly qualities.

When designers opt for the superior durability of hot dip galvanized steel, they are using a natural material with aesthetic and protective capabilities that maximises the use of public capital and space. The vision of inspired designers can be realised without compromising their environmental integrity.

In this issue of galvanize!, we look at two case studies separated by 3,500km, but similar in their efforts to promote environmental awareness and responsibility.

*Australian Garden, Cranbourne VIC*

galvanizers
ASSOCIATION OF AUSTRALIA

# LAKE VASTO PERTH WA

Cities and their councils are constantly looking for ways to incorporate practical development solutions into their built environment whilst taking care to meet society's ever more demanding environmental standards. Lake Vasto, in Perth's Ozone Reserve, has managed to incorporate a number of uses and benefits, not least being its environmentally sustainable utilisation of water rources.

Lake Vasto is named after Perth's Sister City, Vasto, a port city on Italy's Adriatic Coast. The lake was opened in 2004 by the Lord Mayor of Perth, Dr. Peter Nattrass, and the Mayor of Vasto, Dr. Filippo Pietrocola.

Lake Vasto has a key role to play in a more environmentally friendly irrigation system for foreshore parks and reserves in Perth. It is filled with water collected from a 300m deep artesian supply beneath Langley Park. This water is then used to irrigate most of the City of Perth's 70 hectares of foreshore parkland.

A key contributor to maintaining its environmental friendliness while improving aesthetics is a new water treatment and pumping facility that reduces the level of iron staining on surrounding footpaths and buildings – an unsightly consequence of using bore water for irrigation in an urban setting.

The benefits of the systems are not only environmental and aesthetic, they are also economic and raise efficiency. This is achieved through an automated, in-ground irrigation system that replaces inefficient and labour-intensive travelling irrigators and above-ground hoses.

The City of Perth also had a vision to make the area visually appealing and to promote its use to the public. Part of this involved the design and construction of a boardwalk along the shores of the lake. The boardwalk was constructed by combining timber and galvanized steel, two natural, durable and earthy materials.

The boardwalk was designed by landscape architect, Stuart Pullyblank of TRACT in Perth. Stuart often uses natural and robust materials such as galvanized steel in his work. He said that choosing galvanized steel was easy.

"I like the raw quality. It's simple to use and I haven't had any problems with it."

The virtual elimination of maintenance costs through the use of galvanized steel also appeals to designers. Stuart says that one of the main advantages is that, "Galvanizing is very durable. There is no damage to the coating during transport and installation like there is with other coatings such as powder coating and paint."

Environmental and visual concerns were also an issue since this was a waterway. "Once in use," says Stuart, "And in this particular application, we couldn't afford a coating that falls or chips off into the water."

"Galvanized steel is tough and durable in public traffic situations, but warm enough that people accept its presence."

*Acknowledgments and further information:*
*Roger Blackburn, Project Manager – City of Perth*
*Stuart Pullyblank, TRACT (WA)*

# THE AUSTRALIAN GARDEN

## ROYAL BOTANIC GARDENS CRANBOURNE, VICTORIA

The Royal Botanic Gardens Board Victoria (RBGBV) plays a leading role in the conservation of plants and improving the understanding of plants. It does this though biodiversity research, conservation and education programs and the study of habitats. The RBGBV is responsible for the administration of two major gardens: 363 hectares of remnant bushland and wetland at Royal Botanic Gardens Cranbourne; and 38 hectares of heritage landscapes at Royal Botanic Gardens Melbourne.

The education and visitor programs have recently been expanded with the opening of the first stage of the Australian Garden within the Cranbourne site. The Australian Garden will showcase much of the remarkable plant and animal life unique to the Australian environment.

The Australian Garden was designed by landscape architects, Taylor Cullity Lethlean, in conjunction with respected plant designer, Paul Thompson. It has won a number of design awards, with the Australian Institute of Landscape Architects jury saying in 1998 that the garden elevated, "…the notion of floral displays to those of whole ecosystems, underlying soil and water systems manifest and inspiring further exploration."

The Australian Garden also seeks to explore the relationship between the living environment and our daily life. Humans have a significant impact on the Australian environment and this facility will offer a greater understanding of this interaction.

The Australian Garden is a source of natural environmental knowledge and also contains various demonstrations of sustainable practices for home gardeners. This relevance to everyday life will show visitors how the latest research and designs can help them to make their gardens more environmentally sustainable. Issues such as water conservation, native plant home gardens and "the future garden" are examined.

Other features include the Kid's Backyard, which rejects the usual artificial "plastic" equipment and encourages children to use their imagination and explore using organic materials such as a red-gum timber Hortasaurus, a large animal made from salvaged timber.

The Australian Garden is also home to some stunning artworks. These include the Ephemeral Lake, which introduces the story of water in our vast and arid continent, and the Escarpment Wall, which is inspired by the red sandstone escarpments such as those found at Uluru and King's Canyon. The huge 100m long Escarpment Wall Sculpture runs along the Rockpool Waterway and is made up of striking red-rusted weathering steel.

The use of steel and timber throughout the Australian Garden contributes to its earthy, natural feel. Galvanized steel was used to build the bridge that spans the water where the Rockpool Waterway ends. Galvanized steel is also used with timber to create a shelter for visitors either looking for a place to rest or sit and eat.

Galvanized steel has been a part of the rural environment in Australia for over 130 years. It was used for shelter, water collection and fencing. Anyone travelling through our continent will be familiar with the iconic visual and functional status of galvanized steel. It is appropriate that galvanized steel has been used in the Australian Garden in conjunction with other traditional and natural materials.

The Australia Garden is located in Cranbourne and is approximately a 50 min drive from Melbourne. It has a visitor centre, a Gardens Shop, and a café. Guided tours and education programs are also available to visitors.

The second stage is planned to commence in late 2006 and will cover 15 hectares. It is expected to take three years to design and construct.

*Acknowledgments and further information:*
*Eleanor Bridger – Royal Botanic Gardens Melbourne*

# After-Fabrication Galvanizing Specification Details

# AS/NZS 4680:2006

'Hot dip galvanized (zinc) coatings on fabricated ferrous articles'

## Standard Specification for Hot Dip Galvanized Coatings to be used in conjunction with the Australian/New Zealand Standard 4680 for use with materials specifications.

### Scope

This specification covers the after-fabrication galvanized coating applied to general steel articles, structural sections, angles, channels, beams, columns, fabricated steel assemblies, castings, threaded fasteners, steel reinforcement and other steel components.

This specification does not apply to the galvanized coating on semi-finished products such as wire, tube or sheet galvanized in continuous, semi-continuous or specialised plants.

### Galvanizing

All articles to be galvanized shall be handled in such a manner as to avoid any mechanical damage and to minimise distortion.

Design features that may lead to difficulties during galvanizing should be pointed out prior to dipping.

Galvanizing parameters such as galvanizing temperature, time of immersion and withdrawal speed shall be employed to suit the requirements of the article.

The composition of the zinc in the galvanizing bath shall not be less that 98.0% zinc.

### Coating Requirements

**1. Thickness**

The thickness of the galvanized coating shall conform to Table 1 and Table 2 in AS/NZS 4680:

**Table 1**

**Requirements for coating thickness and mass for articles that are NOT centrifuged.**

| Article thickness mm | Local coating thickness Microns | Average coating thickness Microns | Average coating mass g/m$^2$ |
|---|---|---|---|
| 1.5 mm or less | 35 | 45 | 320 |
| Over 1.5 to 3 mm | 45 | 55 | 390 |
| Over 3 to 6 mm | 55 | 70 | 500 |
| Over 6 mm | 70 | 85 | 600 |

**Table 2**

**Requirements for coating thickness and mass for articles that are centrifuged.**

| Article thickness mm | Local coating thickness Microns | Average coating thickness Microns | Average coating mass g/m$^2$ |
|---|---|---|---|
| Less than 8 mm | 25 | 35 | 250 |
| 8 mm and over | 40 | 55 | 390 |

The thickness of the galvanized coating shall first be tested by the purchaser/designer at the galvanizer's works, using an approved magnetic measuring device. In the event of any dispute, an independent test shall be carried out in accordance with AS/NZS 4680, Appendix G.

**2. Surface Finish**

The galvanized coating shall be continuous, adherent, as smooth and evenly distributed as possible, and free from any defect that is detrimental to the stated end use of the coated article. On silicon killed steels the coating may be dull grey, provided the coating is sound and continuous.

The integrity of the coating shall be determined by visual inspection and coating thickness measurements.

Where slip factors are required to enable high strength friction grip bolting, these shall be obtained after galvanizing by suitable mechanical treatment of the faying surfaces.

Where a paint finish is to be applied to the galvanized coating, this should be advised at the time of order. Galvanized coatings shall have all spikes removed and all edges shall be free from lumps and runs.

**3. Adhesion**

The galvanized coating shall be sufficiently adherent to withstand normal handling during transport and erection.

galvanizers
ASSOCIATION OF AUSTRALIA
ABN 60 004 579 828

We provide information, publications and assistance on all aspects of design, performance and applications of hot dip galvanizing.
124 Exhibition Street Melbourne Victoria 3000 Telephone **03 9654 1266** Facsimile **03 9654 1136**
Email **gaa@gaa.com.au** Web page **www.gaa.com.au**