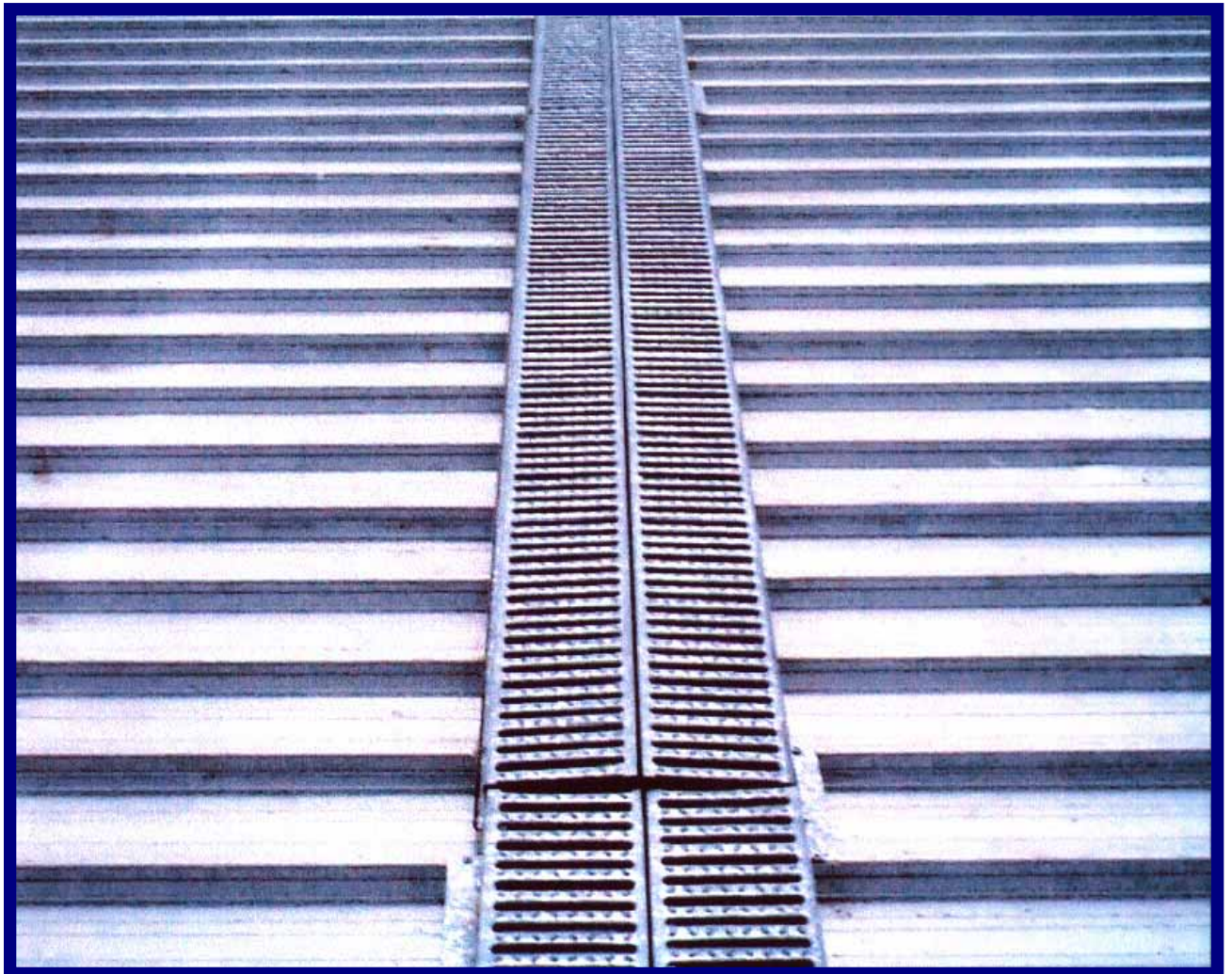




Performance Report
on
Interlok Grating

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1.0 INTRODUCTION

Interlok[®], produced by BHP Building Products, is a lightweight inter-locking grating system that is made from zinc-coated steel sheet. The steel is grade G300 (300Mpa minimum yield stress) and the coating class is Z450 (450g/m² minimum coating mass on both sides).

The grating works on the principle of male and female connections locking into one another, side by side. Both the male and female connections have an upturned bottom lip that could enable water and/or contaminants to become entrapped in the lip and cause higher corrosion rates.

Therefore the purpose of this report is to ascertain whether or not corrosion rates experienced in the bottom lip of these connections are higher than those being experienced elsewhere on the grating.

2.0 RESULTS

2.1.0 Areas Tested

There were three (3) areas tested, including Deception Bay Shopping Centre, Morayfield Shopping Centre and HBP Building Products at Archerfield. In all areas tested, readings were taken from two sites, and from each site, readings were taken from the tip, side and bottom lip. The age of the Interlok[®] grating tested ranged from approximately three (3) to six (6) years.

The results of all of the tests performed are presented in the following format:

Site No.	Steel section description.
	Site description and service life period.
	Original coating mass minimum requirement (AS1650-1989).
	Coating thickness readings (microns) as at 31/08/99.

All of the tests performed are shown in micrometers (*um*), however some readings have been converted to grams/m² by multiplying the result by 7.15 as per AS1650-1989 Appendix G 5.2. All coating thickness readings were taken using a calibrated Elcometer 345 electronic digital coating thickness gauge.

The test areas were all cleaned with a wire brush and wiped down with a cloth, prior to testing. The wire brushing removes the zinc carbonate film that forms on the zinc coating as part of the natural ageing process. The patina that forms greatly reduces the amount of contact the coating has with the environment, and therefore increases the life of the coating. This film is removed so an accurate reading can be achieved.



2.2.1 Site One: Interlok[®] Grating at Deception Bay Shopping Centre

The shopping centre is located approximately two (2) kilometres from Deception Bay and it would therefore, at times, be susceptible to mild salt carrying winds. The Z450 Interlok[®] was installed in late 1993 to early 1994, making it more than five (5) years old.

In all cases, the average readings still remain around the minimum coating thickness required when the grating was installed, which, under AS1650/1989 was $31.5\mu\text{m}$. It is important to realize that under a 'Z' coating class (in this case Z450), the standard measures the total zinc mass on **both sides**. To measure this in the same terms as hot dip galvanized products we need to halve the Z450 measurement ($450/2=225\text{ grams/m}^2$). If this figure (225 g/m^2) is then divided by 7.14, you get a micron reading, in this case $31.5\mu\text{m}$.

Readings taken:

1.	Bottom Lip:	36, 32, 33, 33, 35, 25, 38, 37, 33, 39	Ave: $34.1\mu\text{m}$
	Side Flange:	32, 31, 31, 33, 39, 25, 25, 25, 36, 36	Ave: $31.3\mu\text{m}$
	Top Tread:	33, 34, 33, 33, 30, 30, 34, 30, 36, 36	Ave: $32.9\mu\text{m}$
2.	Bottom Lip:	36, 33, 34, 33, 36, 19, 39, 33, 27, 35	Ave: $32.5\mu\text{m}$
	Side Flange:	25, 32, 38, 31, 31, 24, 36, 30, 25, 30	Ave: $30.2\mu\text{m}$
	Top Tread:	35, 30, 30, 28, 29, 33, 31, 29, 33, 31	Ave: $30.9\mu\text{m}$



Deception Bay Shopping Centre Roof



Deception Bay Shopping Centre – Bottom Lip Micron Thickness



2.2.2 Site Two: Interlok[®] Grating at Morayfield Shopping Centre

This shopping centre was opened in 1997, which means the grating would have been installed on the roof in the later half of 1996, making it almost three (3) years old. Again the readings remain relatively close to the minimum coating thickness required when initially installed, that being $31.5\mu\text{m}$.

This roof provides a very interesting example, because it slopes from left to right (refer to the following photo). This type of design does not permit the water to flow out of the lipped channels on the grating, yet there is very little if an difference between the readings taken from the top tread and those on the bottom lip.

The reason for this is quite simple, Brisbane is a relatively dry and warm city. The Bureau of Meteorology reports that Brisbane's annual mean daily maximum temperature is 25.4°C and the annual mean daily evaporation is 5.3mm (commonwealth of Australia 1999). Combine this with the fact that the steel during some months will get well above 60°C it is highly likely that any water that happens to collect in the bottom lip will evaporate within one day.

Readings taken:

1.	Bottom Lip:	29, 31, 32, 31, 33, 23, 27, 28, 25, 24	Ave: $28.3\mu\text{m}$
	Side Flange:	34, 36, 33, 32, 28, 34, 32, 32, 23, 29	Ave: $28.1\mu\text{m}$
	Top Tread:	36, 29, 30, 39, 24, 33, 38, 31, 36, 25	Ave: $32.1\mu\text{m}$
2.	Bottom Lip:	34, 33, 22, 33, 33, 30, 39, 35, 31, 28	Ave: $31.8\mu\text{m}$
	Side Flange:	31, 29, 31, 34, 33, 30, 24, 30, 38, 28	Ave: $27.7\mu\text{m}$
	Top Tread:	28, 28, 23, 35, 39, 31, 30, 32, 28, 35	Ave: $30.9\mu\text{m}$



Morayfield Shopping Centre – Roof Slopes from Let to Right



Morayfield Shopping Centre – Top Tread Micron Thickness



2.2.3 Site Three: Interlok[®] Grating at BHP Building Products Archerfield

The final area tested was a walkway area at BHP in Archerfield that utilized the Interlok[®] grating system. This walkway was installed in early 1994. This walkway is partially covered by the office it leads into and is entirely covered from the afternoon sun by the main production shed.

All rails sit reasonably flat, which does not allow water to flow out of the down turned lips easily. As can be seen on the following page, there is no evidence of rust in any of the downturn lips, nor do the readings indicate that there is likely to be in the near future. The only sign of rust that can be seen in the photo on the following page is along the edges. This is due to the fact that the product is made from continuously galvanized sheet and when it is cut and rolled to size, it leaves exposed edges.

Obviously by Hot Dip Galvanizing the grating, this problem would be totally eliminated, because all edges are covered with a heavy uniform coating of zinc. Hot Dip Galvanized grating would also provide a zinc coating at least twice as thick as a standard Z450 coating and because the life of a zinc coating is directly proportional to the amount of zinc, this equates to at least twice the life.

Readings taken:

1.	Bottom Lip:	20, 28, 30, 32, 31, 27, 23, 30, 23, 21	Ave: 26.5 μ m
	Side Flange:	20, 32, 32, 23, 20, 26, 26, 20, 27, 34	Ave: 26.0 μ m
	Top Tread:	24, 21, 23, 26, 27, 32, 34, 35, 32, 36	Ave: 28.0 μ m
2.	Bottom Lip:	24, 28, 28, 26, 25, 35, 29, 22, 25, 28	Ave: 28.0 μ m
	Side Flange:	20, 31, 25, 22, 25, 18, 29, 36, 26, 22	Ave: 25.4 μ m
	Top Tread:	31, 24, 28, 20, 20, 30, 30, 22, 26, 33	Ave: 26.4 μ m



BHP Archerfield



BHP Archerfield



3.0 CONCLUSION

All areas tested have shown very little corrosion of the zinc coating since being installed. This is due mainly to the Brisbane environment, which enables a stabilizing zinc carbonate film to form on the coating, this in turn encapsulates it and reduces the amount of contact that the zinc has with the environment, therefore prolonging the life.

Interestingly, the highest corrosion rates appear to be on the sides. This is due in part to the fact that they are wearing against one another all day, through expansion and contraction of the steel, the wind moving it, and being walked on.

Through the tests conducted, there appears to be no difference between the corrosion rates being experienced on the top tread and those in the bottom lip. In almost all cases, the readings are within 1-2 microns of one another. The difference in millimetres is 0.001-0.002, and this sort of deviation is always experienced with a galvanized coating. These reasons therefore strongly suggest that the corrosion rates on the top tread **are no different** to those experienced in the bottom lip.

The reason for there being no difference in corrosion rates comes down to two factors:

1. The mild nature of the Brisbane environment.
2. The high daily maximum temperature experienced in the Brisbane area. This evaporates very quickly any moisture or water that becomes entrapped in the bottom lip.



4.0 REFERENCES

AS1650-1989, "*Hot-Dipped Galvanized Coatings On Ferrous Articles*". Standards Australia.

AS4680-1999, "*Hot Dip Galvanized (Zinc) Coatings On Fabricated Ferrous Articles*". Standards Australia.

Bureau of Meteorology, 1999, "www.bom.gov.au/climate/averages/tables/cw_040223.shtml", Commonwealth of Australia.

Galvanizers Association of Australia, 1995, "*Hot Dip Galvanizing*", Fourteenth Edition.