2016

V005

INGAL
GUARDRAIL

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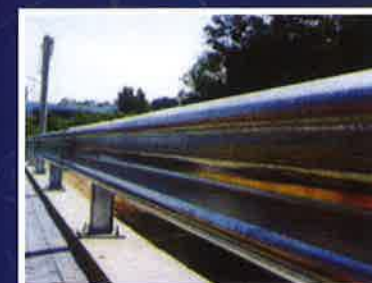
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INDUSTRIAL GALVANIZERS
A valmont COMPANY

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Introduction

Proven on the race track and now installed on highways all over the world, the unique protection offered by the corrugated steel beam system of guardrail is used to save lives and property. **Ingal guardrail** conforms to the American Association of State Highway and Transportation Officials (AASHTO) standards and to the stanards requirement of the Malaysia Public Works Departments (JKR).

Applications

Ingal guardrail has an application wherever life or property requires protection. On expressways, **Ingal guardrail** protects trouble spots by preventing vehicles from running off the road. As a median barrier it prevents head-on collisions. Readily visible, its pleasing appearance makes it suitable for boundary markings and protective barriers in parking areas.

Damage Reduction

Controlled flexibility enables **Ingal guardrail** to deflect out-of-control vehicles back onto the road parallel to the direction of traffic flow - and not back into oncoming traffic. Damage is minimised through rounded bolt heads, beam laps facing away from the traffic direction, and specially designed end sections which prevent vehicles striking the end of a run of guardrail.

Durability

Ingal guardrail is hot dip galvanized after fabrication to ensure corrosion resistance. Galvanizing is in accordance with ISO, BS or ASTM Standards. Bolts, nuts, washers and all accessories are also galvanized.

Strength

Continuous beam design of Ingal **guardrail** ensures that an impact load on any one section beyond its elastic limit will be transferred through the high strength joint to adjacent sections. All joints are made with eight specially designed bolts which have rounded heads. At each joint the rail sections overlap by 3 18mm thereby guaranteeing a positive splice.
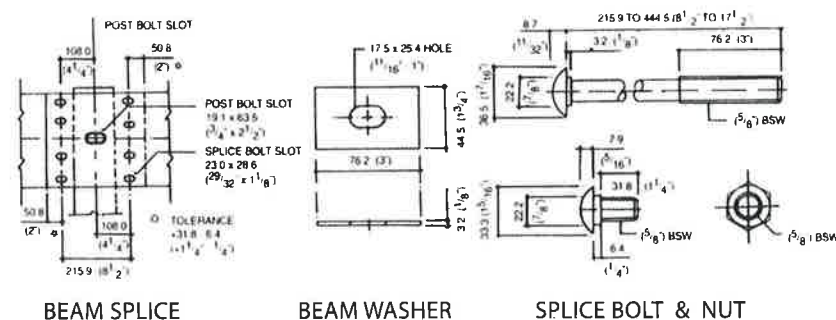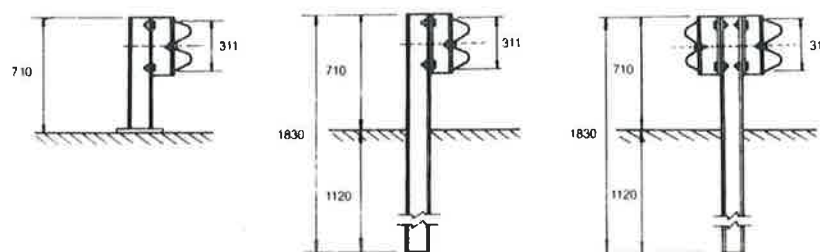
STANDARD PANEL
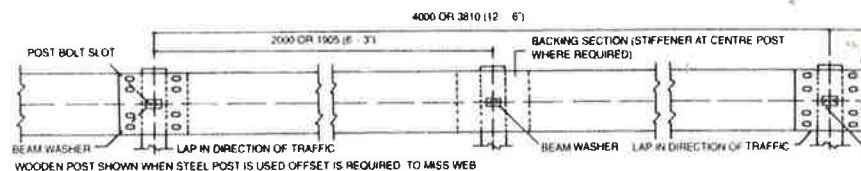
SECTION THROUGH BEAM
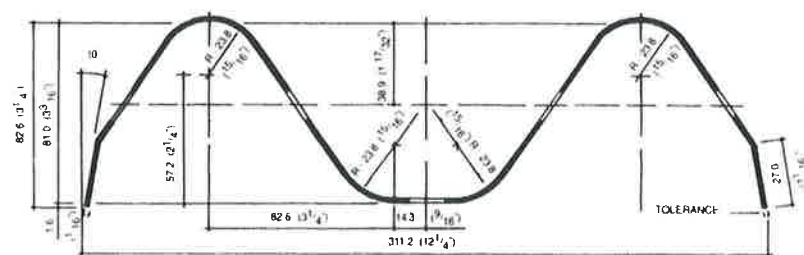
BEAM SPICE, BEAM WASHER, SPLICE BOLT & NUT

BEAM SPLICE   BEAM WASHER   SPLICE BOLT & NUT

STANDARD POST

NOTE: ALL DIMENSIONS ARE SUBJECT TO MANUFACTURER'S TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCE ARE SHOWN.
ALL DIMENSIONS IN MILLIMETRE (EQUIVALENT DIMENSIONS IN FEET & INCHES GIVEN IN PARENTHESIS)

Curves

Ingal guardrail can be installed on curves without lessening of strength or safety. No special attachments are needed. Guardrail sections can be supplied to fit any radius from two (2) metres to forty-five (45) metres. Longer radius curves in excess of 45 metres can be obtained using stardard straigh sections. The guardrail may be curved either with traffic face concave or convex.

Calculating Guardrail Quantities

A. GUARDRAIL	Divide length of barrier (metres) by four (4) to determine the number of rails required.	
B. POSTS	Add one (1) unit per run to the number of rails.	
C. BLOCKS	Number of blocks is equal to the number of posts.	
D. TERMINAL ENDS	Provide one (1) terminal end at each end of barrier.	
E. SPLICE BOLTS M16 X 32	Multiply the number of rails by eight (8) and then add eight (8) units per length of run.	
F. BLOCK BOLTS M16 X 40	Multiply the number of blocks by two (2)	
G. RAIL BOLTS M16 X 50	Same quantity as posts.	
H. RECTANGULAR WASHERS	Same quantity as posts.	
I. REFLECTOR STRIP	Number of reflector strip is equal to the number of rails.	
J. ROUND WASHER	As required.	

Curves Details

L= 3810mm, 4000mm or 5000mm
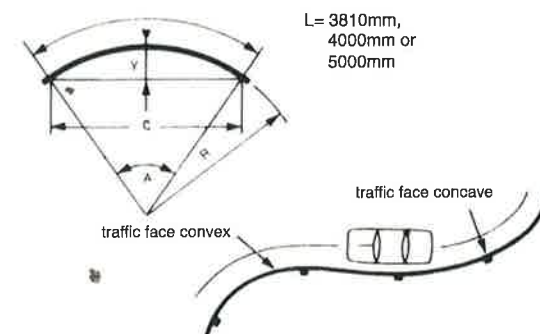
Example

Calculation of material requirements for 1km long barrier rail (Single run).

GUARDRAIL	1000 ÷ 4	250
POSTS	250 + 1	251
BLOCKS	250 + 1	251
TERMINAL ENDS	2	2
SPLICE BOLTS	250 x 8 + 8	2008
BLOCK BOLTS	250 x 2 + 2	502
RAIL BOLTS	250 + 1	251
RETANGULAR WASHER	250 + 1	251
REFLECTOR STRIP	250 + 1	251

Specification & Technical Data - Beams

STANDARD	AASHTO M 180 - 89 (Class A Type 2)				
LENGTH / THICKNESS / WEIGHT	PRODUCT CODE	EFFECTIVE LENGTH (mm)	OVERALL LENGTH (mm)	NOMINAL UNCOATED THICKNESS (mm)	WEIGHT (kg)
	IG03	3810	4128	2.67	44.0
	IG04	4000	4318	2.67	46.0
GALVANIZING	Minimum Single-Spot Test	: 1,100 g/m² (3.603 oz/ft²)			
	Minimum Triple-Spot Test	: 1,220 g/m² (4.603 oz/ft²)			
MECHANICAL PROPERTIES	Minimum Yield Point	: 345 MPa (50,000 psi)			
	Minimum Tensile Strength	: 490 MPa (70,000 psi)			
	Minimum Elongation	: 12%			

● Post & Block Attachment

Standard Post
6mm (t) galvanized
4 holes - 18mm Ø
1 slot 20 x 25mm

178   76

1830

Block
6mm (t) galvanized
4 holes - 18mm Ø
1 slot 20 x 25mm

178   76

360

● End Section & Buffer

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END SECTION

BUFFER END