

TECH DATA REF: PROPPING

PRODUCT: RUMBLE GRID
REFERENCE: TDT03-PAGE 1

shorehire.

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TECHNICAL DATA

Introduction

Shore Hire have developed a portable rumble grid for the building and construction industry to remove dirt and mud from wheel treads of construction vehicles before returning to public roads. Shore Hire rumble grids are easy to clean and can be connected together with the use of pins to increase lengths to suit site requirements.

Key Features

- Portable
- Reduces road clean up costs
- 4000mm x 2150mm sections
- Sections connect together with pins
- Easy to clean out

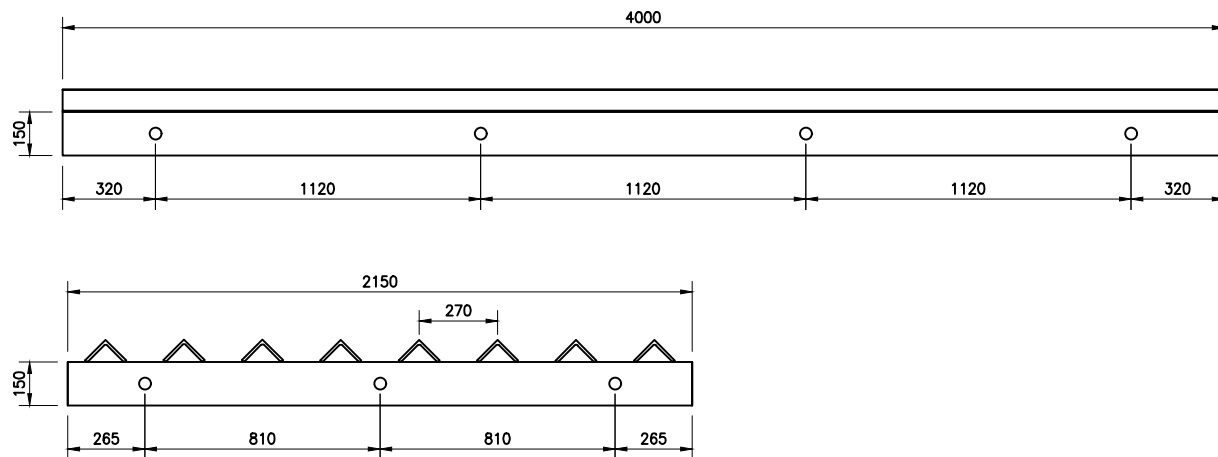
Safe Working Load

- 150 UB at 2m span (Critical section)
- 2 Tonne point load per beam
- 12 tonne capacity per rumble grid
- 1.5 Factor of Safety against failure
- 3mm Maximum deflection in beam

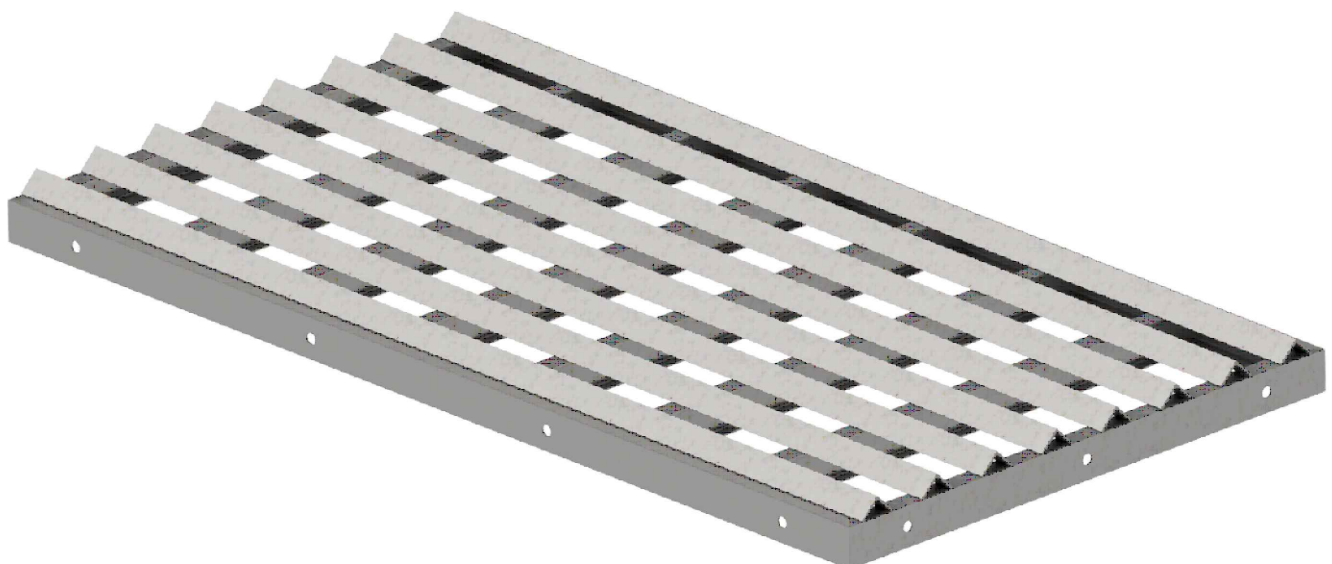
AS Standards/ Regs

- Grade 300 Steel to AS 3678: Structural Steel
- Design of steel to AS 4100: Steel Structures
- Loading Criteria to AS 1170.0 - General Principles
- National Heavy Vehicle Regulator
- Mass Limits for Single Axle & Axle Groups

RUMBLE GRID SPECIFICATIONS		
LENGTH	WIDTH	WEIGHT
2150mm	4000mm	854kg



RUMBLE GRID DIMENSIONS



Geometry for (Steel Member M02): Steel simple beam

Description = 150UB14.0 (G300)	lx = 6.66 x10 ⁶ mm ⁴
Span (L) = 2000 mm	Axis = X (X),(Y)
Span type = S (S)imple,(E)xt,(I)nt,(C)ant,(P)rop,(F)ixed,(O)ther	Ag = 1780 mm ²
Material type = S (T)imber,(S)teel,(C)onc.,(SC)comp. steel,(O)ther	Density = 78.6 kN/m ³
	E = 200000 MPa

Loading

Uniform loads (kN/m)				Point loads (kN)			
Uniform loads	UDL	Partial 1	Partial 2	Point loads	PL 1	PL 2	PL 3
Dead load (wdl) =				Dead load (pdl) =			
Live load (wll) =				Live load (pll) =	20.00		
Start from LHS (mm) =	0			Pos. from LHS (mm) =	1000		
End from LHS (mm) =	2000			Ultimate load (p*) =	30.00	0.00	0.00
S.Wt =	0.14	kN/m					
Ultimate load (w*) =	0.17	0.00	0.00	Include S.Wt =	Y (Yes),(N)o		
				Strength loadcase =	C (D)ead Only,(C)omb.		
Live Load type =	Permanent (Steel)						
Short term LL (Ψsu) =	1.00	(Ψsp) =	1.00				
Long term LL (Ψlu) =	1.00	(Ψlp) =	1.00				
Actual LL (Ψsa) =	1.00	(Ψla) =	1.00				

Results at midspan (Max +ve M)

Position of result (x) = 1000 mm

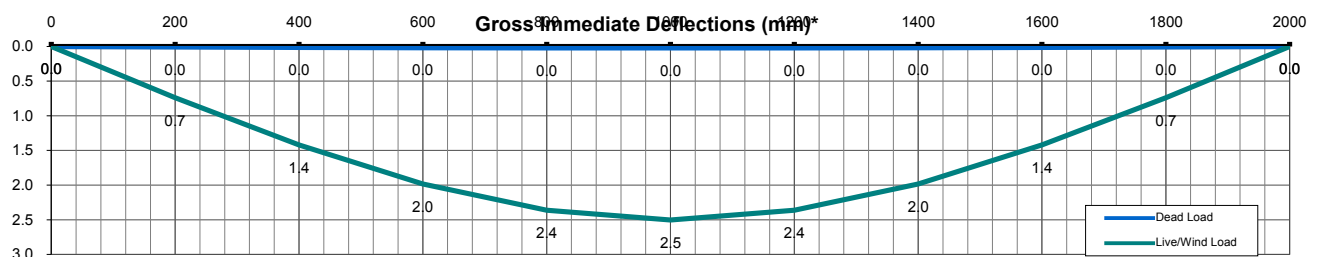
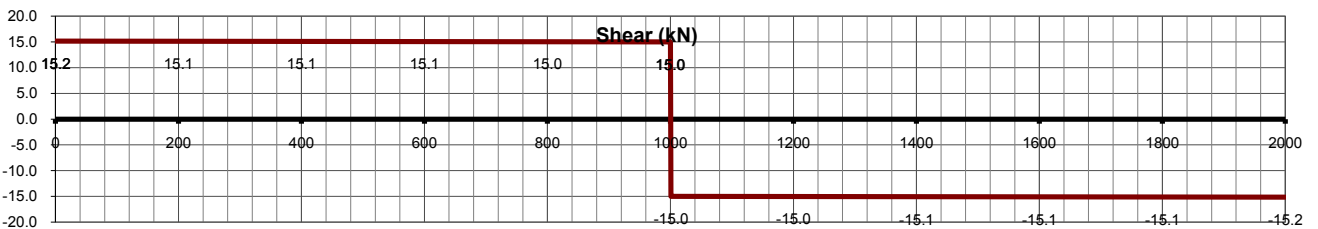
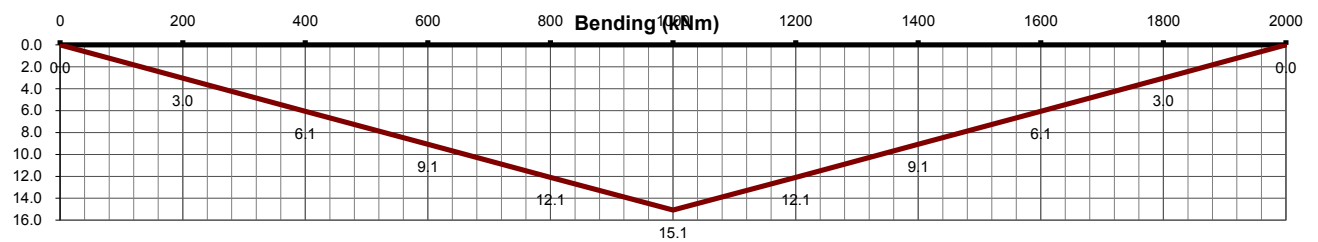
1.20*G+1.50*Q analysed

	Left	At x	Right	Max	At	Min	At	Units	
Rdl	0.14		0.14					kN	
Rll	10.00		10.00					kN	
R*	15.17		15.17					kN	
M*	0.00	15.08	0.00	15.08	1000	0.00	0	kNm	
V*	15.17	15.00	-15.17	15.17	0			kN	Span /
δdl	0.00	0.02	0.00	0.02	1000	0.00	0	mm	91397
δll	0.00	2.50	0.00	2.50	1000	0.00	0	mm	799
δdl+Ψs*δll	0.00	2.52	0.00	2.52	1000	0.00	0	mm	792

δPlI/δTot.II = 1.00

Graphs

* Deflections are Gross Ig immediate - assessment of long term effects to be considered



STEEL MEMBER V5.06

Shore Hire Pty Ltd

Section:	(Steel Member M02) 150UB14.0 (G300)	
Bending:	$M_x^* = 15.1 \text{ kNm} < \phi M_b(4500, \alpha_m=1.35) = 15.5 \text{ kNm}$, $\phi M_b(\alpha_m=1) = 11.5 \text{ kNm}$	OK (0.98)
	No minor bending	
Shear:	$V_x^* = 15.2 \text{ kN} < \phi V_{vm} = 129.6 \text{ kN}$ (Web area full depth)	OK (0.12)
	No minor shear	
Compression:	No compression	
Tension:	No tension	
Deflection:	$\delta_{dl} = L/91397$ (0mm), $\delta_{ll} = L/799$ (3mm), $\delta_{(dl+\psi_s \cdot ll)} = L/792$ (3mm) at 1000mm from LHS	OK

Bending & Shear at critical locations - Section 5 Max. restraint (2.5% flange force) = 2.6 kN

(M* to include first order amplification as required - Cl 4.4.2)

Analysis values = [] C (M) anual, (L)eft, Position (X) from analysis, (R)ight, (C)ritical

Refer to the analysis output

Analysis Axis = [] X (X),(Y)

Major bending (M_x^*) =	15.1 kNm	Minor bending (M_y^*) =	[] 0 kNm
Minor bending (M_y^*) =	0.000 kNm	Shear Force (V_x^*) =	15.2 kN
Shear Force (V_x^*) =	15.2 kN	Shear Force (V_y^*) =	0.000 kN
Shear Force (V_y^*) =	0.000 kN	Span / Segment Length (L) =	4500 mm
Effective length factor (k_e) =	0.70	$\alpha_m =$	1.35
$k_e =$	0.70 (User defined)		
Effective length ($L_e = L \cdot k_e$) =	3150 mm		
$\phi =$	0.9 Table 3.4		
$\phi M_{sx} =$	29.4 kNm	Bending (x) =	OK (0.98)
$\phi M_{bx}(\alpha_m=1) =$	11.5 kNm		
$\phi M_{bx} =$	15.5 kNm	Shear =	OK (0.12)
$\phi M_{sy} =$	5.70 kNm		
$\phi V_v =$	129.6 kN		
$\phi V_{vm} =$	129.6 kN	$I_x =$	6.66 x10 ⁶ mm ⁴
Shear capacity based on uniform shear distribution		S.Wt =	0.140 kN/m

Compression - Section 6 (No compression)

Axial compression (N_c^*) =	0.0 kN	Axial compression (N_c^*) =	[] 0 kN
Major axis length (L_x) =	10000 mm	Eff. X length factor (k_{ex}) =	1.00
Minor axis length (L_y) =	1500 mm	Eff. Y length factor (k_{ey}) =	1.00
Braced or Sway member =	S (B)raced, (S)way		
		Major axis effective length (L_{ex}) =	10000 mm
$\phi N_s =$	512.6 kN	Minor axis effective length (L_{ey}) =	1500 mm
$\phi N_{cx}(k_{ex}=1.00) =$	104.1 kN		
In-Plane $\phi N_{cx}(k_{ex}=1.00) =$	104.1 kN		
$\phi N_{cy}(k_{ey}=1.00) =$	271.3 kN		
In-Plane $\phi N_{cy}(k_{ey}=1.00) =$	271.3 kN		
$\phi N_c =$	104.1 kN		

Tension - Section 7 (No tension)









Axial tension (N_t^*) =	0.0 kN	Axial tension (N_t^*) =	[] 0 kN
$k_t =$	1.00 Table 7.3.2		
$\phi N_t =$	512.6 kN		

Combined

$\phi M_{rxt} =$	29.4 kNm	$\phi M_{ixt} =$	29.4 kNm	$\phi M_{oxt} =$	15.5 kNm
$\phi M_{rxc} =$	29.4 kNm	$\phi M_{ixc} =$	29.4 kNm	$\phi M_{oxc} =$	15.5 kNm
$\phi M_{ryt} =$	5.70 kNm	$\phi M_{iyc} =$	5.70 kNm	$\phi M_{tx} =$	15.5 kNm
$\phi M_{ryc} =$	5.70 kNm			$\phi M_{cx} =$	15.5 kNm

***, a, b** For disclaimer clarification please refer to page 4

Mass limits for single axles and axle groups

Axle/s	Axle group/tyres	Axle/vehicle details	Mass limit (tonnes)
	Single axle Single tyres	Steer axle *, a, b Non steer axle, tyres less than 375mm Non steer axle, tyres 375mm to 449mm Non steer axle, tyres at least 450mm	6.0t 6.0t 6.7t 7.0t
	Single axle Dual tyres	Pig trailer Any other vehicle A complying bus, or a bus authorised to carry standing passengers under an Australian road law An ultra-low floor bus with no axle groups, only 2 single axles	8.5t 9.0t 10.0t 11.0t
	Twin-steer axle group Single tyres	Non load-sharing suspension system Load-sharing suspension system	10.0t 11.0t
	Tandem axle group Single tyres	Less than 375mm 375mm to 449mm At least 450mm	11.0t 13.3t 14.0t
	Tandem axle group Dual/single tyres	Single tyres on one axle and dual tyres on the other axle A complying bus	13.0t 14.0t
	Tandem axle group Dual tyres	Pig trailer Any other vehicle	15.0t 16.5t
	Tri-axle group Single tyres	Single tyres on all axles with section width less than 375mm, or single tyres on one or two axles and dual tyres on the other axle or axles Pig trailer with either single tyres with at least a 375mm section width, dual tyres on all axles or a combination of those tyres	15.0t 18.0t
	Tri-axle group Dual tyres	Vehicle other than a pig trailer with either single tyres with at least a 375mm section width, dual tyres on all axles or a combination of those tyres	20.0t