

## 1: INFORMATION & PROCEDURES

<b>INSPECT:</b> Manufacturer data plates, tyre ratings	<b>MEASURE:</b> axles/ axle units & total length; C-C of extreme axles	<b>WEIGH:</b> Unladen mass of axles/ axle units	<b>LOAD:</b> Payload (&CoG) for each semi-trailer axles/ axle units
<b>CALCULATE: (3)</b> Permissible maximum combination mass (PMCM)	<b>CALCULATE: (4)</b> Payload mass distribution-rear axle to front axle		
<b>CHECKS: (5)</b> Compliance of tyres, rims, wheel and axle group loads	<b>CHECKS: (5)</b> Compliance of Power, traction and steering	<b>CHECKS: (5)</b> Overall dimensions & bridge formula compliance	



## National Road Traffic Act-Reg. 240 (Defined maximum axle loads)

REG. 240: (Max. axle mass load)	STEERING: (2 wheels/axle)	NON-STEER: (2 wheels/axle)	NON-STEER: (4 wheels/axle)
per wheel:	3850kg	4000kg	
per axle:	7700kg	8000kg	9000kg
2 axle unit:	15400kg	16000kg	18000kg
3 axle unit:	23100kg	24000kg	24000kg

## 2: HOW TO DETERMINE THE PERMISSIBLE MAXIMUM COMBINATION MASS (PMCM) OF A VEHICLE CONFIGURATION

**MASS LIMIT REGULATIONS:**

- TYRES: (REG 238,243)**
- AXLE LIMITS: (REG 240)**
- POWER: (REG 239)**  
240kg/kW x Power (Trucks)  
>234kW for 56t  
400kg/kW x Power (H.Tractor)  
>120kW for 48t H.T.
- TRACTION: (REG 239)**  
Trucks: 5x Massload  
≥11.2t for 56t  
Haulage Tractor: 6x Massload  
≥8t for 48t H.T.
- STEERING: (REG 242)**  
>11% of Tr. & 1<sup>st</sup> semi mass  
>4.8t for 43.7t  
>15% of H. Tractor mass  
>20% of Rigid unit mass only  
>30% of Double steer units  
>12% of Tractor axle mass
- BRIDGE FORMULA: (REG 241)**  
i) Minimum distance (m):  
(Mass-18)/2.1 = \_\_\_ (m)  
>18.1m for 56t  
or ii) Max Load (t):  
(Distance x 2.1) + 18 = \_\_\_ (t)
- MASS LIMITS: (REG 234-243)**  
PMVM, PMCM <56t  
H. Tractor (1 drive axle) <48t

**COLOR KEY: MINIMUM REQUIREMENT**      **COLOR KEY: MAXIMUM LIMIT**      **TEXT COLOR KEY: HEADINGS - REFERENCE / RULE - EXAMPLE**

Bridges: Check Max Load A to C

Bridges: Max Load across B to E = (Distance x 2.1) + 18 = \_\_\_(t)

Bridges: Max Load across A to E = (Distance x 2.1) + 18 = \_\_\_(t)

Bridges: Max Load D to G = (Dist x 2.1) + 18 = \_\_\_(t)

Bridges: Max Load across B to G = (Distance x 2.1) + 18 = \_\_\_ (t)      Eg. 14.5m x 2.1 + 18 = 48.4t max

Bridge Formula (1<sup>st</sup> to last axle):  
Min 18.1m for 56t interlink [Calculation: min distance for a 56t PMCM is: (Load-18)/2.1 = (56-18)/2.1 = 18.1m] or Check Max Load A to G

225 (b): 10m semi-trailer wheelbase limit      10m semi-trailer wheelbase limit

221 (g): 22m length limit; 223 (a): width limit of 2.6m; 224 (b) height limit of 4.3m

**DIMENSIONAL LIMITS: (REG 221,223,224)**

### 3: EXAMPLE: PMCM DETERMINATION: HAULAGE TRACTOR

POWER = 119kW

REG 240 Axle Limits: 7.7t, 8t, 16t, 16t

ITEM:	A:	B:	C+D:	E+F:	LEAST OF:
TYRES:	Speed and load ratings; tyre uniformity				Check all
LOAD DISTRIBUTION:	Check load distribution across tyres, axles (<10% variance)				Check all
AXLE LIMITS (Reg. 240):	7.7t	8t	16t	16t	47.7t
AXLE LIMITS (MANUF.):	Check off data plate/manufacturers specifications				Check
GCM:	Vehicle GCM limit off data plate (manufacturer) - eg. 60t				60t
POWER:	400kg/kW (H. Tractors) x 119kW (example) = 47.6t				47.6t*
TRACTION:	6x the drive axle unit mass (H Tractors); eg. 6 x 8t = 48t (2wd)				48t
STEERING:	>15% of sum tractor axle masses on steering = (7.7t + 8t) x 15% = >2.4t				Check >2.4t
BRIDGE FORMULA:	1 <sup>st</sup> to last axle (A-F): eg. 17.7m x 2.1 + 18 = 55.2t				55.2t
BRIDGE:	A-B: eg. 3.1m x 2.1 + 18 = 24.5t				Check
BRIDGE:	B-F: eg. 14.6m x 2.1 + 18 = 48.7t (excluding steering axle A)				Check
BRIDGE:	C-F: eg. 8.1m x 2.1 + 18 = 35t (excluding steer & drive axles A + B)				Check
BRIDGE:	A-D: eg. 11m x 2.1 + 18 = 41.1t (excluding last axle set E + F)				Check
BRIDGE:	B-D: eg. 7.9m x 2.1 + 18 = 34.6t (excluding axle A & last axle set E + F)				Check
COMBINATION LIMIT:	Permissible max combination mass (PMCM) = 48t(2wd), 56t(4wd) or least				<47.6t*

### 3: EXAMPLE: PMCM DETERMINATION: TRIAXLE

POWER = 220kW

REG 240 Axle Limits: 7.7t, 18t, 24t

ITEM:	A:	B+C:	D+E+F:	LEAST OF:	
TYRES:	Speed and load ratings; load uniformity; tyre uniformity				Check all
LOAD DISTRIBUTION:	Check load distribution across tyres, axles (<10% variance)				Check all
AXLE LIMITS (Reg. 240):	7.7t	18t	24t	49.7t	
AXLE LIMITS (MANUF.):	Check off data plate/manufacturers specifications				Check
GCM:	Vehicle GCM limit off data plate (manufacturer) - eg. 75t				75t
POWER:	240kg/kW (Trucks) x 220kW (example) = 52.8t				52.8t
TRACTION:	5x the drive axle unit mass @ 18t x 5 = 90t or >20% mass on drive				90t
STEERING:	>11% of: Truck + 1 <sup>st</sup> semi mass = (7.7t + 18t + 24t) x 11% = 5.47t				Check >5.47t
BRIDGE FORMULA:	1 <sup>st</sup> to last axle (A-F): eg. 14.6m x 2.1 + 18 = 48.7t				48.7t*
BRIDGE:	A-C: eg. 4.75m: 4.75 x 2.1 + 18 = 28t				Check
BRIDGE:	B-F: eg. 11.3m: 11.3 x 2.1 + 18 = 41.7t (excluding steering axle A)				Check
COMBINATION LIMIT:	Permissible maximum combination mass (PMCM) = 56t or least				<48.7t*

### 3: EXAMPLE: PMCM DETERMINATION: INTERLINK

POWER = 260kW

REG 240 Axle Limits: 7.7t, 18t, 18t, 18t

ITEM:	A:	B+C:	D+E:	F+G:	LEAST OF:
TYRES:	Speed and load ratings; load uniformity; tyre uniformity				
LOAD DISTRIBUTION:	Check load distribution across tyres, axles (<10% variance)				
AXLE LIMITS (Reg. 240):	7.7t	18t	18t	18t	61.7t
AXLE LIMITS (MANUF.):	Check off data plate/manufacturers specifications				
GCM:	Vehicle GCM limit off data plate (manufacturer) - eg. 75t				
POWER:	240kg/kW (Trucks) x 260kW (example) = 62.4t				
TRACTION:	5x the drive axle unit mass @ 18t x 5 = 90t or >20% mass on drive				
STEERING:	11% of mass of Truck + 1 <sup>st</sup> semi = (7.7t + 18t + 18t) x 11% = 4.8t				
BRIDGE FORMULA:	1 <sup>st</sup> to last axle (A-G): eg. 19.25m: 19.25 x 2.1 + 18 = 58.4t				
BRIDGE:	A-C: eg. 4.75m: 4.75 x 2.1 + 18 = 28t				
BRIDGE:	B-G: eg. 16m: 16 x 2.1 + 18 = 51.6t				
BRIDGE:	D-G: eg. 8.75m: 8.75 x 2.1 + 18 = 36.4t				
BRIDGE:	A-E: eg. 12m: 12 x 2.1 + 18 = 43.2t				
BRIDGE:	B-E: eg. 8.75m: 8.75 x 2.1 + 18 = 36.4t				
COMBINATION LIMIT:	Permissible maximum combination mass (PMCM) = 56t* or least				

## 4: ESTIMATING PAYLOAD DISTRIBUTIONS

UNLADEN MASS: 2.7t, 3.6t, 6.2t, 6.1t

ASSUMED: LOADING NEAR CENTRE OF TRAILERS:  
Calculation: 11.8t x 4.8 + 5.7 = 9.9t (By proportions)

ANTICIPATED LOADING: REAR TRAILER: 11.8t

ANTICIPATED LOADING: FRONT TRAILER: 11.8t

UNLADEN MASS: 2700kg, 3600kg, 6200kg, 6100kg

LOAD: 7720kg, 7200kg, 15800kg, 16000kg

## 4: ESTIMATING PAYLOAD DISTRIBUTIONS

UNLADEN MASS: 5.5t, 7t, 7t

ASSUMED: LOADING NEAR CENTRE OF TRAILERS:  
Calculation: 29t x 6.2 + 10.65 = 16.88t (By proportions)

ANTICIPATED LOADING: 29t

UNLADEN MASS: 5500kg, 7000kg, 7000kg

LOAD: 7494kg, 17123kg, 23883kg

## 4: ESTIMATING PAYLOAD DISTRIBUTIONS

UNLADEN MASS: 5.5t, 7t, 6t, 5t

ASSUMED: LOADING NEAR CENTRE OF TRAILERS:  
Calculation: 18t x 4.5 + 7.25 = 11.172t (By proportions)

ANTICIPATED LOADING: REAR TRAILER: 18t

ANTICIPATED LOADING: FRONT TRAILER: 14.5t

UNLADEN MASS: 5500kg, 7000kg, 6000kg, 5000kg

LOAD: 6728kg, 15595kg, 17505kg, 16172kg

## 5: CHECKS

POWER = 119kW

UNLADEN + REAR + FRONT: 2700kg, 3600kg, 6200kg, 6100kg

TOTAL: 2700kg, 7720kg, 15800kg, 16000kg

BRIDGE FORMULA: A-F, A-B, B-F, C-F, A-D, B-D

LOAD: 42220kg, 10420kg, 39520kg, 31800kg, 26220kg, 23520kg

## 5: CHECKS

POWER = 220kW

UNLADEN + REAR + FRONT: 5500kg, 7000kg, 7000kg

TOTAL: 7494kg, 17123kg, 23883kg

BRIDGE FORMULA: A-F, A-C, B-F

LOAD: 48500kg, 24617kg, 41006kg

## 5: CHECKS

POWER = 260kW

UNLADEN + REAR + FRONT: 5500kg, 7000kg, 6000kg, 5000kg

TOTAL: 6728kg, 15595kg, 17505kg, 16172kg

BRIDGE FORMULA: A-G, A-C, B-G, D-G, A-E, B-E

LOAD: 56000kg, 22323kg, 49272kg, 33677kg, 39828kg, 33100kg