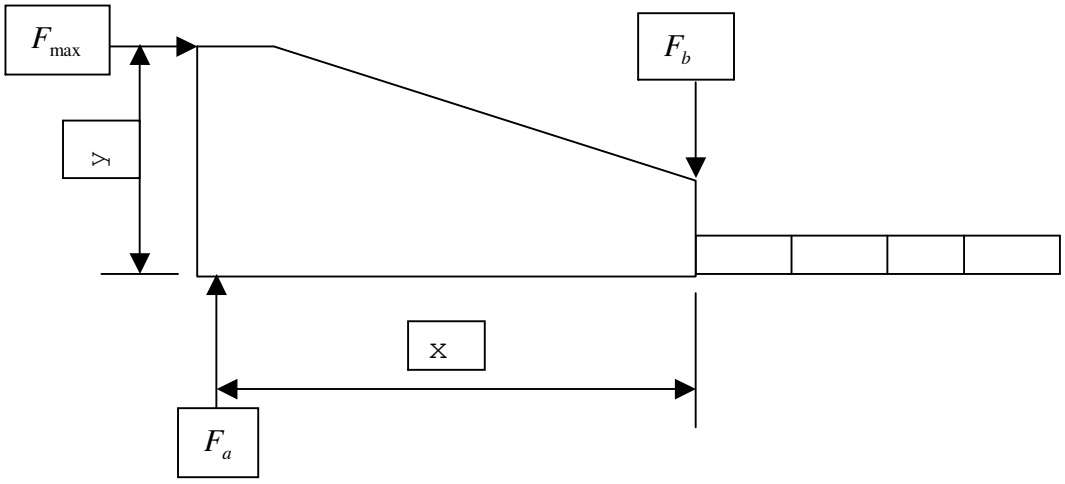
Uplift Forces
Vertical Forces acting on the Rails

- The maximum overturning force is taken at the centre point of the distance covered by the guide claws and occurs at the moment when all friction elements fitted to all rails are in action This applies to auxilary rails also.

- If guide claws are fitted to the running rails then the calculated total vertical force must then be halved in order to determine the force acting on each rail. If guide claws are to be fitted to auxilary rails as well, then the calculated total force would then have to be divided by the number of rails to be used with guide claws fitted.

Example:

Assuming that the buffer stop guide claws and all friction elements were installed onto the running rails. Then the following would apply for a type 6 ZEB/4 (total 14 friction elements at 40 kJ/m/element + 50% as absolute worst case tolerance due to rail quality etc.).



Given:	**x**	**=**	2.142 m
	y	**=**	1.030 m
	Max. braking capacity	**=**	560 kN (= 14 * 40 kJ/m)
	F_{max}	**=**	840 kN (= 1.5 * 560 kN)

Required: **Total Uplift Force = F_a**

$$[F_a = F_b] = \frac{F_{max} * y}{x} = \frac{840 * 1.03}{2.142} = 403.9kN$$

Therefore Uplift Force per running rail = **F_a : 2 = 403.9 : 2 = 202 kN**

End of Example

Note: This is the worst case scenario and the clients track engineers will have to ensure that the rails resistance to bending will withstand the above named force in a ballast track situation. DFF track, due to its method of design, will be able to withstand forces of higher magnitude.

K5386 Miami Uplift Forces

Rawie Friction Element Buffer Stop Type 10 ZEB/5a

Friction Element Buffer Stop Type **10 ZEB/5a** as per drawing no. 10-070-000

- 10 Twin Friction Element of 3 clamp bolts each element, torque 150 Nm, under the Buffer Stop on running rails, braking: E = **400** kJ/m
- 5 pairs of Twin Friction Element of 3 clamp bolts each element, torque 150 Nm, under the Buffer Stop on auxiliary rails, braking: E = **400** kJ/m

Given:	**x**	=	2250 mm
	y	=	955 mm (average height of impact plate)
	Max. braking capacity	=	800 kN (= 20 * 40 kJ/m)
	F_{max}	=	1200 kN (= 1.5 * 800 kN)

Required: **Total Uplift Force** **= F_a**

$$[F_a = F_b] = \frac{F_{\max} * y}{x} = \frac{1200kN * 955}{2250} = 509.3kN$$

Therefore Uplift Force per running rail = **F_a : 2 = 254.6 : 2 = ~255 kN**