



**CRANE WITH STANDARD BUMPER**



**STORM BUMPER**

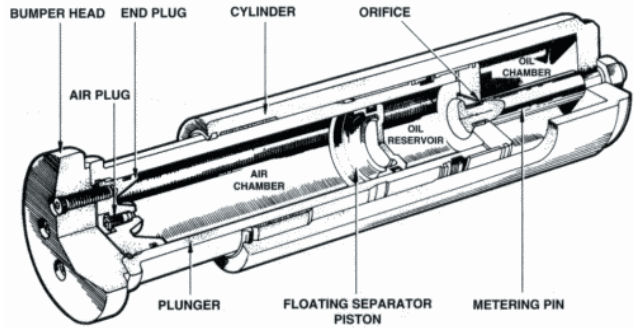
Container cranes, gantry cranes and other rail mounted machines are often located in environments where the danger from high winds or microbursts can cause serious safety problems. Sudden, high winds can propel a crane along its runway until it impacts the end stops. Often the impact speed is considerably higher than the full load rated travel speed of the crane. A storm bumper can offer protection for most container cranes at speeds up to 5 miles per hour with limited bumper end force. Storm bumpers consist of one or more hydraulic bumpers mounted on the end stops of the pier. A suitable striking surface on the crane leg or end truck engages the bumper.

Controlling impacts and reducing resultant damaging effects have historically been a problem in heavy crane applications. Oleo hydraulic bumpers are efficient and effective energy absorbers that offer the following features:

- Provide uniform deceleration and low end forces, with over 95% efficiency in energy absorption and dissipation
- Allow easy drive down for maximum end approach, through fatigueless gas spring return
- Provide reliability and durability even in caustic or marine environments due to their heavy-duty, forged steel construction
- Are available in a full range of standard bumper sizes and configurations with energy capacity over 1,000,000 ft-lbs
- Are warranted for one year

**OPERATING PRINCIPLE**

The Oleo bumper is basically a large oil dashpot, incorporating a variable orifice, and the sectional illustration shows its simple, heavy duty construction. Under impact, the plunger is forced into the cylinder displacing oil through the orifice into the plunger, moving the separator piston towards the bumper head and compressing the air (nitrogen) to a higher pressure. The compressed air (nitrogen) acting through the separator piston on to the oil forms the recoil “spring” to re-extend the bumper plunger.



**STORM BUMPER SELECTION EXAMPLE**

Container Crane Total Weight	=	2,700,000 lbs
Maximum Allowable End Force Per Corner	=	330,000 lbs
<hr/>		
Impact Weight Per Corner	=	1/2 (Total Crane Weight)
	=	1,350,000 lbs

Impact Weight Per Corner can be greater than the above. Sometimes this can be as much as 60% of total crane weight. In the Engineering Data table below, look in the “Maximum Impact Weight Per Corner” column, under the desired speed, for the calculated “Impact Weight Per Corner”. In this example, we have 1,350,000 lbs and the Storm Bumper Model SB-6 at 5 mph is rated for up to 1,392,952 lbs. Therefore, this is an acceptable solution. Now, we can calculate the Kinetic Energy per corner as follows:

$$\begin{aligned}
 \text{Kinetic Energy Per Corner at 5 mph} &= \frac{1}{2} (\text{Impact Weight} / 32.2) \times (\text{Speed} \times 1.467)^2 \\
 &= \frac{1}{2} (1,350,000 \text{ lbs} / 32.2) \times (5 \text{ mph} \times 1.467)^2 \\
 &= 1,127,841 \text{ ft-lbs} \\
 &\quad \text{(Kinetic Energy)} \\
 \text{Actual End Force Per Corner at 5 mph} &= \frac{\text{Kinetic Energy}}{(\text{Efficiency}) \times (\text{Stroke})} \\
 &= \frac{1,127,841 \text{ ft-lbs}}{(.90) \times (47 \text{ in}/12)} \\
 &= 319,954 \text{ lbs}
 \end{aligned}$$

**ENGINEERING DATA**

Storm Bumper Model	Stroke (inches)	Max End Force Per Corner (lbs)	Energy Capacity (ft-lbs)	Maximum Impact Weight Per Corner At Typical Speeds: (lbs)		
				3 MPH	4 MPH	5 MPH
SB - 1	23.5	165,000	290,800	967,328	544,122	348,238
SB - 2	31.5	165,000	389,800	1,296,645	729,363	466,792
SB - 3	47.0	165,000	581,600	1,934,655	1,088,244	696,476
SB - 4	23.5	330,000	581,600	1,934,655	1,088,244	696,476
SB - 5	31.5	330,000	779,600	2,593,289	1,458,725	933,584
SB - 6	47.0	330,000	1,163,200	3,869,310	2,176,487	1,392,952

Note: Other speeds available upon request.

Custom designed solutions for higher speeds, special deceleration requirements or other physical constraints are available. Please consult GANTREX for application assistance and a complete proposal.

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