

Lateral load capacity of Gantrail clips



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Gantrail clips are designed to carry the lateral forces from crane wheels. These are primarily the horizontal forces that are perpendicular to the direction of the rail. They are also known as side forces. They can result from a number of different effects. These include the horizontal movement of the lifted load, the movement of the trolley and the steering action as the crane passes down the track. The clips also provide limited restraint from movement of the rail along its length. The Gantrail clips have been tested and the designs have been subject to analysis following the methods in the British Standard for structural steel design, BS 5950. This standard has similar requirements to regulations and standards used in many other countries. The result of the analysis and testing has allowed Gantrail to define safe design values for the clips it sells. These are presented in data sheets for the products and elsewhere in the Company's literature and web site. The purpose of this Technical Guidance Note is to present other matters that are of relevance when considering the choice of clips.

FACTORS TO CONSIDER WHEN RECOMMENDING CLIPS

If the horizontal wheel load is not given, it should be estimated. The simplest guide is to take the vertical wheel load and multiply it by a suitable factor. Gantrail often use a figure of 15%. For a more precise answer it may be necessary to go back to the customer or the crane maker. A number of standards published in the UK and elsewhere give methods of calculating these forces. For Europe the FEM rules are used (Fédération Européenne de la Manutention rules = European Federation of Materials Handling and Storage Equipment). These may be consulted but the designer of the rail installation will seldom have all the information needed to make full use of them. Many other standards are in use in other countries. The Gantrail technical department can also assist. If a figure below 15% of the wheel load is given, this should probably be treated with caution. The strength of the Gantrail welded base clip is dependent on the size and length of weld used. The normal welding detail is given on the product data sheets. Not all clips need to be welded all around the base. This can be an advantage when installing clips. There should be a weld in the 'V' adjacent to the rail on the Type 9216, 9220 and 8226 clips. It should not be too big as it may foul the movement of the clip top relative to the base. In some countries notably Germany, welding to girders is not considered to be good practice. If welding is to be used it is a better detail for fatigue, to have no start/stop points on the completed weld. Hence, it is preferable to have a continuous weld around the full perimeter of the base. The weld can vary in size along the different edges of the clip base. Thus it may need to be laid down in two or more runs.

- The price difference between grade 4.6 and grade 8.8 bolts is not great. Grade 4.6 bolts only give 40% of the horizontal load carrying capacity as grade 8.8 bolts. The price difference of an installed clip with a 4.6 instead of 8.8 bolts is minimal. Hence, it is recommended that clips fitted with bolts i.e. Type 3 and Type 7 clips be used with grade 8.8 through bolts. All special bolts supplied by Gantrail as captive bolts for use in Type 8 and 9 clips are grade 8.8. It is recommended that customers purchasing Type 8 clips buy grade 8.8 bolts or the local equivalent strength designation.
- Welded studs are made from similar material to grade 4.6 bolts. Type 3 clips give very good test results when fastened with a welded stud. However, it is a consequence of the design codes that the stud needs to be considered to be equivalent to a grade 4.6 bolt when specifying horizontal load capacity. Not all Gantrail bolt fixed clips are made with a recess to accommodate a weld around the

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base of a stud. Hence the use of welded studs is not a recommended method for fixing crane rail clips.

- In heavy-duty applications, where repeated or fatigue loading is present; the design loads quoted should be reduced. The amount will depend on circumstances and in extreme cases they should be halved.
- In the attached table clips are designated with four numbers followed by two numbers. E.g. 9220/20. The full description for a clip also includes two further two digit numbers e.g. 9220/20/45/13. The 45 refers to the height of the metal part over the rail and the 13 to the size of the rubber compression member. The last two groups of digits are not considered to have any significance on the strength of the clip and hence are omitted from the table. All clips with the same first six digits are considered to have the same strength.

Clip designation	Method of fixing - Bolt or stud - Bolt grade	Design lateral load capacity kN (Normal duty)	Design lateral load capacity tonnes force (Normal duty)
3112/10	4.6 bolt	8.4	0.86
3112/10	8.8 bolt	21	2.14
3116/10	4.6 stud or bolt	16	1.63
3116/10	8.8 bolt	38	3.87
3120/15	4.6 stud or bolt	30	3.06
3120/15	8.8 bolt	75	7.65
3124/15	4.6 stud or bolt	38	3.87
3124/15	8.8 bolt	125	12.74
3124/20	4.6 stud or bolt	50	5.10
3124/20	8.8 bolt	125	12.74
3224/20	4.6 stud or bolt	100	10.19
3224/20	8.8 bolt	250	25.48
3226/15	4.6 stud or bolt	100	10.19
3226/15	8.8 bolt	250	25.48
6124/20	4.6 stud or bolt	50	5.10
6124/20	8.8 bolt	125	12.74
7120/10	4.6 stud or bolt	30	3.06
7120/10	8.8 bolt	75	7.65
8119/15	Weld*	120	12.23
8219/20	Weld*	200	20.39
9116/08	Weld*	55	5.61
9116/10	Weld*	40	4.08
9120/15	Weld*	120	12.23
9216/08	Weld*	130	13.25
9220/20	Weld*	200	20.39

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