THE RIDING PATH

by the Savera Group

The riding path is defined as the set of already assembled elements that make up the path which along the lift travels. In the past, guide rails were sold and the final quality of the riding path became the lift installer's responsibility. The current trend is to supply riding paths whose quality will not depend on the expertise of the assembler.

The most important parameters to bear in mind with the riding path are:

- Jumps at the joints
- Straightening of guide rails
- Alignment of guide rails during assembly
- Assembly of guide rails with brackets
- Dynamic deflection

As the frequencies at which the human body is most susceptible to vibrations in the horizontal plane fall between 28Hz, the greater or lesser influence of these parameters depends on the speed. Table 1 shows the distances at which defects can be critical at each speed. It also indicates the critical areas for each of the parameters according to the distance at which they occur.

Jumps at the Joints

The absorption of lateral displacement by the car-roller system can fluctuate between 75mm and 200mm. Table 1 indicates jumps at the joints especially affect low speeds. At speeds higher than 3m/s, the frequency is greater and human perception smaller. Although possible jump levels are high according to International Organization of Standardization (ISO) standards, at high speeds, this parameter becomes less important, because the rest of the parameters include far greater displacement levels.

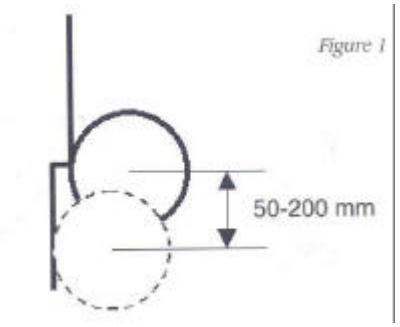

Figure 1

m/s	Distances	in mm						
Speed	2 Hz	8 Hz	Jumps	1m / Deflection	5m / Defection	Guide Alignment	Assembly	Dynamic Deflection
0.6	300	75						
1	500	125						
1.6	800	200						
3	1500	375						
4	2000	500						
5	2500	625						
8	4000	1000						
10	5000	1250						
12	6000	1500						
Displacement levels: ISO 7465 in mm			0.21	0.5	2.5	1	2	5
Displacement levels: ISO 7465 EXTRA in mm			0.12	0.2	1	0.5	0.5	5

Straightening of Guide Rails

The 1m/deflection is of great importance for speeds of up to 4m/s. At speeds higher than 4m/s, the 5m/deflection becomes more significant both because it is within the frequencies of human perception and also because of the displacement level. The 5m/deflection can be reduced considerably with alignment systems during assembly.

Alignment of Guide Rails During Assembly

This parameter is very important for comfort because it affects all speeds and produces very high acceleration levels. It depends too much on the expertise and means available to the installer. The alignment task becomes particularly complicated with large guides, which are difficult to handle. Additionally, this job requires subsequent controls of the joint. The current trend is to ensure alignment at the design stage, guaranteeing correct alignment of the guides simply by fastening the guides to the fishplates.

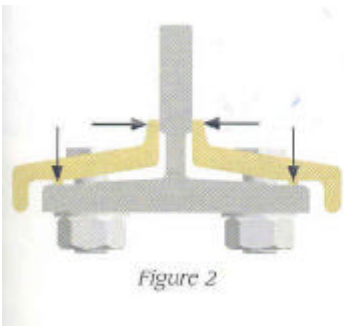

Figure 2

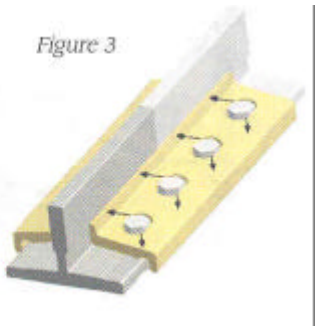

Figure 3

The self-aligning system allows automatic alignment at the two axes of the joint simply by tightening the nuts. This allows the displacement level at the joint to be reduced in such a way that the new riding path acts like a continuous guide rail.

Assembly of Guide Rails with Brackets

At speeds greater than 4m/s, it is especially important to install brackets properly since displacement levels can be very high if high-precision positioning systems are not available. Adjustment and positioning systems with 0.2 precision must be used in order to maintain the same levels as the rest of the parameters.

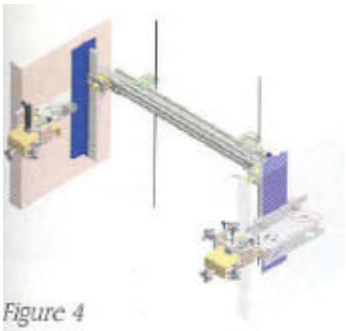

Figure 4

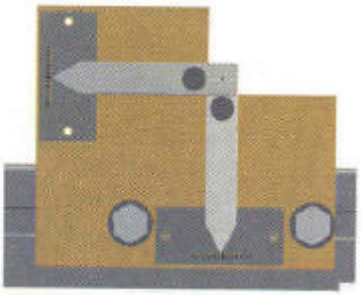

Figure 5

Dynamic Deflection

For the calculation of forces, the EN 81 standard allows deflections of up to 5mm between clamps. This calculation is only correct if guides are able to bear the force generated by the displacement of the lift. However, this deflection affects comfort at speeds greater than 4m/s. Above 4m/s, movements caused by distortion between clamps occur at frequencies within human perception and at much greater displacement levels than the rest of the parameters. When calculating the size of the guide rail, dynamic deflection must be reduced to levels similar to those of the other parameters.

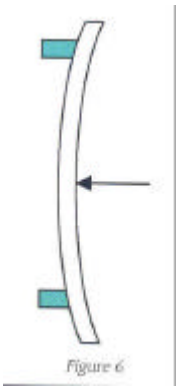

Figure 6

Maintenance

Having chosen and correctly assembled the riding path, an important task remains to be carried out, which is to maintain the riding path in its original state. During the establishment of a building, temperature variations can cause the riding path to vary and thus changing the original parameters.

The elements that can cause the state of the riding path to change are:

- Clips
- Fishplates

Clips

In addition to holding the guide and bearing the generates forces, clips must be able to slide over the guides without causing buckling. If the clips used are too rigid, they will not be able to slide, whereas if they are not rigid enough, they will not be able to bear the forces applied. The trend is to use rigid clips with controlled force in such a way that the force they exert on the guides will allow displacement.

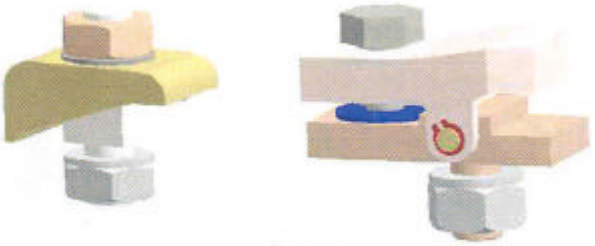

Figure 7

The clips shown in Figure 8, must apply a load on the guide rails which is suitable to the load for which the riding path was designed, without affecting the thickness of the foot depth of the guide rail.

When total isolation between the riding path and the building is required as a result of high displacement levels or in earthquakeprone areas, it is better to use systems in which displacement occurs within the bracket itself. This system allows the riding path to be kept intact no matter how much the building moves.

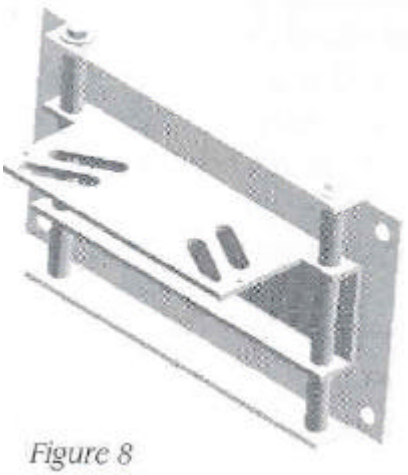

Figure 8

Joint Fishplates

Standard joint fishp1ates hold the guide rail fastened on the X axis, but on the Y axis, they are on1y held in place through a friction force between the fishp1ate and the guide. During practical tests, when applying loads of less than 200kg with a 2500mm distance between brackets, sliding S between the fishp1ates and the guides occurs, causing misalignment at the joints. In order to ensure the joint of the guides when considerable loads are applied, the fish-plates must be fastened to the two guides in such a ways that there can be no displacement. This can be achieved with the type of fishplates shown in Figure 9, which are especially recommended for tall buildings, medium-to-high-speeds and heavy loads.

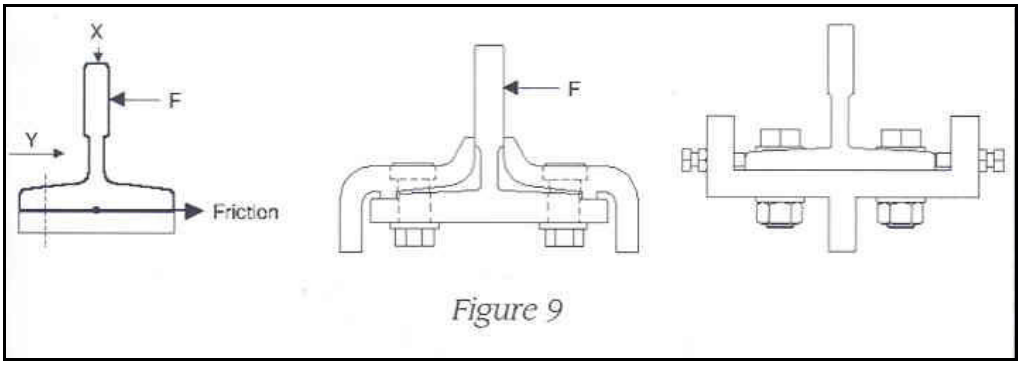

Figure 9

Conclusions

The study of the riding path requires in-depth analysis for each individual application so that all parameters are within suitable levels in order to achieve required comfort. At times, we may be concentrating on one particular parameter when there could be other parameters affecting comfort to a greater extent in the application being analyzed at a given moment. Suitable and simple means must be provided in order to guarantee that both the guide-rail alignment and bracket assembly provide us with the required riding path for each application.

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