

## The ability of Kährs activity floor to withstand point loads generated by retractable seating arrangements

### SUMMARY

The ability of Kährs activity floor to withstand point loads was compared to the loading situations when using retractable seating. The results showed that the flooring can withstand a point load of at least 425 kilograms force, which is significantly greater than the expected maximum momentary point load generated by an active audience on retractable seating of 345 kgf, and the 200 kgf constant load generated by a seated audience. The laboratory test did however not simulate the repeated loading situation one would expect in real-world use.

### **Introduction**

Retractable seating used in sport halls can generate point loads of 55 kilogram force (no audience), 200 kgf (seated audience) and a momentary point load of 345 kgf (active audience) according to the retractable seating manufacturer Audience Systems Ltd. The point load carrying capacity of Kährs activity floor is however unknown. In this experiment, the load carrying capacity of Kährs activity floor was tested and the results compared to the loading situations when using retractable seating.

### **Method**

A testing setup was created (see photo below) to simulate the load of a wheel in an Audience Systems Ltd. retractable seating arrangement. The steel testing "wheel" had the same dimensions as that of the commercial polyurethane product, *i.e.* 50 mm radius and 40 mm wide. A slowly increasing force was applied at the perceived weakest point (halfway between support strips) of a number of floor boards until the point of audible (distinct noise) failure, and the force was recorded.

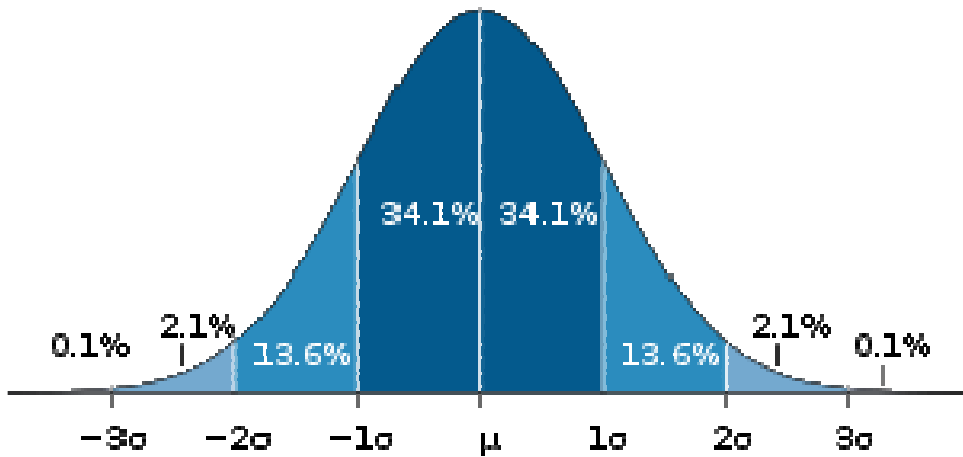


**Results**

The failure values are given in the following table in terms of Newton and kilogram force (kgf).

Test #	Failure (N)	Failure (kgf)
1	5400	550
2	5700	581
3	5400	550
4	5500	561
5	5200	530
6	5800	591
7	5100	520
8	4350	443
9	5850	596
10	6600	673
11	4700	479
12	4800	489
Average	5367	547
Standard deviation	601	61
Average - 2 × std dev	4165	425

The "average - 2 × standard deviation" is the value of greatest interest since that is the value above which approximately 98% of all future measurements will lie on the assumption that the statistical distribution is of the normal (bell-shaped) type as in the following figure.



One can thus with a 98% confidence level predict that the next measured failure value will be greater than 425 kgf.

**Conclusions**

Kährs' activity floor can resist point loads of at least 425 kgf, which is greater than the theoretical maximum momentary force of 345 kgf that could be generated by an active audience on an Audience Systems Ltd. seating arrangement. It is also much greater than the 200 kgf point load generated by a seated audience.

The laboratory test thus indicates that Kährs' activity floor should be able to withstand the mentioned loading situations. It would however be advisable to do a real-world test since the flooring was not subjected to a repeated loading situation as one would find in normal use.