Tate®	**DESIGN LOAD** **NEW ACCESS FLOOR PERFORMANCE CRITERIA**
Technical Bulletin #301	

DESIGN LOAD vs. CONCENTRATED LOAD

If you are familiar with Tate's load performance data you will notice that our performance selection charts now list "Design Load" ratings in place of concentrated load ratings (see Figure 1). The long-used concentrated load rating merely verifies that a floor panel will deflect no more than its specified limit under its specified load capacity while supported by steel blocks (blocks are used to simulate the vertical and lateral support of understructure systems). While this rating is useful for distinguishing panel grades, the design load rating better represents how a floor system will perform in a real installation because it is based on tests conducted with panels supported by actual understructure. Just as significantly, the new rating takes into account the system's *yield point* (where permanent deformation begins to occur) and *ultimate load* (failure point). By incorporating yield point, the design load rating indicates the point to which a panel can be loaded and unloaded -- and afterward return to its original state. And by simultaneously incorporating ultimate load (along with an industry accepted minimum safety factor of 2*), all systems will automatically have an overload safety factor of no less than 2 times design load.

System Performance Criteria
The performance chart is divided into two sections to help you evaluate the overall performance of the systems. The System Performance Criteria are the most important to consider because they represent the performance in a typical installation. Panel only criteria such as concentrated load is often used to specify access floor systems however, the test is not representative of an actual installation because it is performed with the panel resting on blocks not understructure.

ConCore® Performance Selection Chart

System Performance Criteria (Tested on Actual Understructure)									**Panel Criteria** *(For Reference Only)*
			Static Loads			Rolling Loads			
Panel	Understructure	System Weight (lbs/ft²)	**Design Loads (lbs)**	**Safety Factors (min 2.0)**	Uniform Loads (lbs/ft²)	10 Passes (lbs)	10,000 Passes (lbs)	Impact Loads (lbs)	Concentrated Loads @ .100" (lbs)
ConCore® 1000	PosiLock™	7.5	**1000**	**PASS**	350	800	600	150	1000
ConCore® 1250	PosiLock™	8.5	**1250**	**PASS**	400	1000	800	150	1250
ConCore® 1000	Bolted Stringer	9.0	**1000**	**PASS**	350	800	600	150	1000
ConCore® 1250	Bolted Stringer	10.0	**1250**	**PASS**	400	1000	800	150	1250
ConCore® 1500	Bolted Stringer	10.5	**1500**	**PASS**	450	1250	1000	150	1500
ConCore® 2000	Bolted Stringer	11.5	**2000**	**PASS**	550	1500	1250	150	2000
ConCore® 2500	Bolted Stringer	12.0	**2500**	**PASS**	650	1500	2000	150	2500

Figure 1 Performance Chart

**The American Society of Civil Engineers (ASCE) recommends a minimum safety factor of 2-2.5 in document ASCE 9-7.02, Design Loads for Buildings and Other Structures, September 2003. The American Institute of Steel Construction (AISC) recommends a minimum safety factor of 2.0 for calculations involving rupture points in steel structures in document ANSI/ANSC 360-50, Specifications for Structural Steel Buildings, March 9, 2005.*

DETERMINING DESIGN LOAD

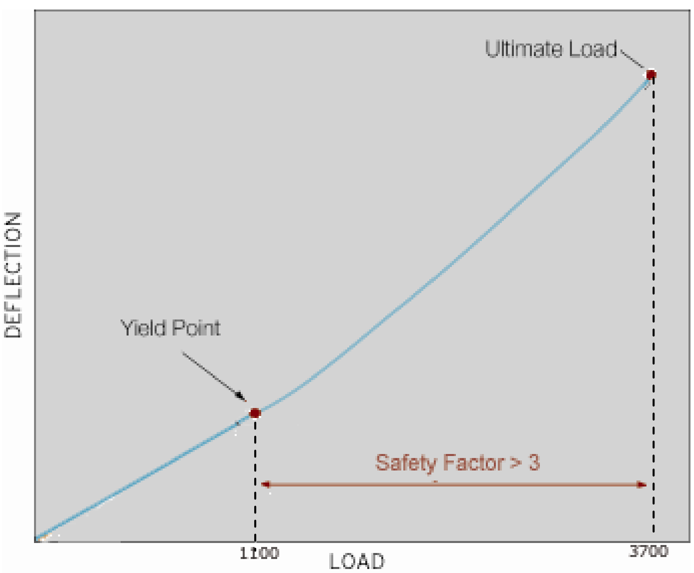
Briefly, the following steps are taken to determine a system's design load rating. A test is conducted where the system's deflections are measured under increasing loads and analyzed to ascertain the system's yield point -- the load at which permanent deformation begins to occur. Next, the system's ultimate load capacity is measured by increasing the amount of load until failure of the panel and/or understructure occurs. The load at which failure occurs is the system's *ultimate load*. The system's Design Load rating is defined as the safe working load that can be applied to the system and is determined by choosing the smaller value of the ultimate load divided by a safety factor of two or the yield point. (Note about test: Design load test is set up as outlined in Section II of CISCA's Recommended Test Procedures for Access Floors. Loads are applied to a one-square inch area of the panel and the Design Load rating is based on the weakest point of the system.)

Design Load = smaller value of (Ultimate Load / 2) or Yield Point

EXAMPLE: CONCORE 1000-POSILOCK DESIGN LOAD

Figure 2 displays the results of a ConCore 1000-PosiLock system yield point/ultimate load test and the system's resultant design load rating. The graph and table indicate that the system's yield point is at 1100 lbs. and the system's ultimate load is 3709 lbs.

System Test: Design Load
(CCN1000 on Posilock Understructure)



Load (lbs.)	Deflection (in.)	
400	0.057	
500	0.070	
600	0.080	
700	0.091	
800	0.103	
900	0.114	
1000	0.126	
1100	**0.142**	**Yield Point**
1200	0.161	
1300	0.184	
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3709	**----**	**Ultimate Load**

Figure 2 Design Load Test

By applying the rule that design load is the smaller value of the ultimate load divided by a safety factor of two or the yield point, the system's design load rating for this test is:

	Actual Test Result	Published Performance
Design Load	1100	1000

STEEL vs. CONCRETE: MODE OF FAILURE

Figure 3 depicts the typical deflection and failure (ultimate load) performance of two materials used to manufacture access floor panels: steel and concrete. On each curve, the first notable deviation from the straight segment of the curve signals the material's yield point, where permanent deformation begins to occur. The ultimate loads indicate the points at which the materials fail. A comparison of the shapes of the curves and the distances to ultimate load illustrates two facts. Steel fails gradually over a relatively long time and provides ample warning of its impending failure while concrete fails with very little warning. Therefore, applying the given definition for design load, you will find that the design load for steel is the yield point whereas the design load for concrete is based on the ultimate load divided by a minimally accepted safety factor of two.

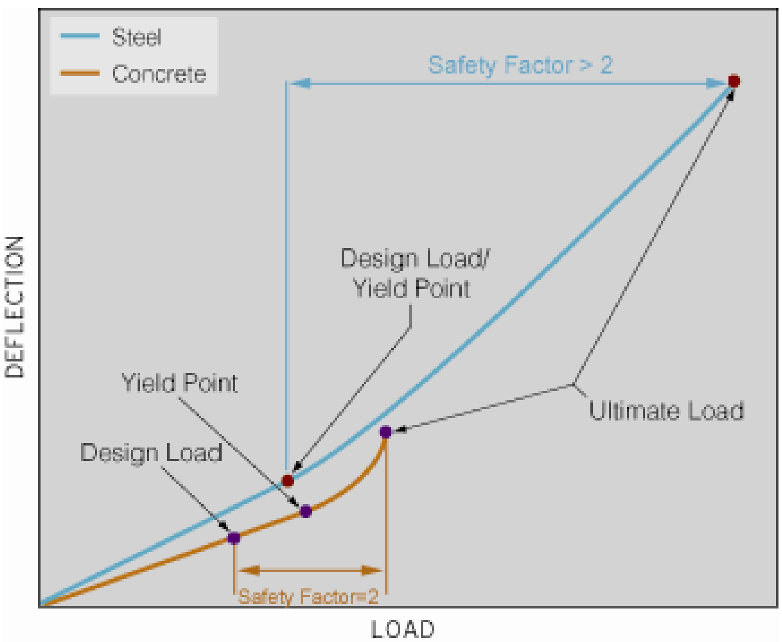

Figure 3 Steel vs. concrete mode of failure.

DEFINITIONS

Yield Point - The load at which *permanent* damage to the system begins to occur.

Ultimate Load - The maximum load that can be applied to the system *without* failure or falling through the floor.

Design Load - The safe working load that can be applied to the system and is determined by choosing the smaller value of the ultimate load divided by a safety factor of two or the yield point.

Safety Factor - The multiple of the design load to the ultimate load.