



R-TANK & HS-20 LOADS

The R-Tank system is capable of easily supporting AASHTO HS-20 and HS-25 loads with safety factors of 1.75 or higher. The system has been used in a variety of applications around the world with tremendous success. Read on and we'll explain how the R-Tank handles heavy loads, and why it will work under HS-20 loads for your project.

Bearing Capacity

The R-Tank's ultimate design load comes from the results of a compression test performed according to ASTM D 2412 & ASTM F 2418, which are the industry standard tests for loading of underground detention systems. Testing was performed by TRI Environmental, and their report along with a technical note about the test methodology is available to supplement this document.

Typical Load Calculation

The AASHTO HS-20 Standard uses a 32,000 lbs axle as the design load (two axles at 25,000 lbs each at depths greater than 38"). To conservatively model the R-Tank's performance under these types of traffic loads, several steps are taken and additional factors considered:

- The axle load is distributed to two sets of dual wheels, each 10" x 20" at 80 psi
- The tire contact area is transferred down through the cover layers at a conservative 1:2 angle (33%) to determine the Area of Applied Load on the top of the R-Tank
- An impact factor is added to account for the movement of the load
- Weight of cover material in a saturated condition is added (130 lbs/cf)

With these factors in place, the HS-20 load can be modeled and the resulting safety factor determined. The table on page 2 shows how the R-Tank performs at various depths of cover, and it suggests which module should be used. Since most projects are designed for HS-20 loads in parking lots, this table is ideal for most installations.

If you are designing for HS-25 loads, or if you are considering applications with multiple HS-20 loads regularly travelling in multiple parallel lanes (for example, active roadways or shipping terminals), tables for these specific circumstances are available.



R-Tank has been chosen for tough applications all over the world.



Unconfined Compression Test

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Third Party Verification

Modeling product performance using engineering equations to ensure a successful project is important. But what really matters is product performance in the field. That's why we've done real-world testing with third party agencies who have installed the R-Tank and subjected it to brutal testing.

One test involved installing 18" of sand cover over an R-Tank^{LD} module (an R-Tank^{SD} should have been used at this depth) without geogrid, and driving a 31 ton dump truck over the system. Even in these harsh conditions, the R-Tank has supported the loads, passing every field test that's been done.



R-Tank field testing.

Real World Performance

Your project **REQUIRES** a proven system. With thousands of installations around the world, R-Tank has proven itself again and again as one of the strongest systems available for underground detention/retention. Specify R-Tank and you can be confident your system will support the traffic loads above. Call ACF today to discuss your project's requirements.



Truck (31 tons) backing over R-Tank.

HS-20 & LRFD Design Tandem Loading - Single Lane Traffic

Item	Cover Depth (inches)													
	6	12	18	20	30	38	48	60	72	84	96	108	120	144
Axle Load (lbs)	32,000	32,000	32,000	32,000	32,000	25,000*	25,000*	25,000*	25,000*	25,000*	25,000*	25,000*	25,000*	25,000*
Wheel Load (lbs)	16,000	16,000	16,000	16,000	16,000	12,500	12,500	12,500	12,500	12,500	12,500	12,500	12,500	12,500
Tire Contact Area (10" x 20" = 200 inch ²)	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Area of Applied Load at 33% Angle of Repose (inch ²)	416	704	1,064	1,200	2,000	2,784	3,944	5,600	7,544	9,776	12,296	15,104	18,200	25,256
Unfactored Wheel Loading Applied to R-Tank (psi)	38.46	22.73	15.04	13.33	8.00	8.98	6.34	8.93	6.63	5.11	4.07	3.31	2.75	1.98
Factored Wheel Loading Applied to R-Tank** (psi)	50.36	29.29	19.07	16.82	9.82	10.77	7.38	10.03	7.17	5.33	4.07	3.31	2.75	1.98
Cover Material Pressure at 130 lbs/cf (psi)	0.45	0.90	1.35	1.50	2.26	2.86	3.61	4.51	5.42	6.32	7.22	8.13	9.03	10.83
Total Load Applied to R-Tank (psi)	50.81	30.19	20.42	18.32	12.07	13.63	11.00	14.55	12.59	11.64	11.29	11.44	11.78	12.81
Ultimate Bearing Capacity of R-Tank Unit (psi)	240.20	134.20	42.90	33.40	33.40	33.40	33.40	33.40	33.40	42.90	42.90	42.90	240.20	240.20
Safety Factor***	4.73	4.44	2.10	1.82	2.77	3.04	3.04	2.30	2.65	3.68	3.80	3.75	20.40	18.75

- R-Tank^{HD}
 - R-Tank^{SD}
 - R-Tank^{UD}
 - R-Tank^{XD}
- * LRFD Tandem Loading controls at depths of 38" or more.
 ** Includes Dynamic Loading Allowance in Accordance with AASHTO LRFD.
 *** In lieu of Live and Dead Load factors, a minimum "Safety Factor" of 1.75 is maintained.



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