



# R-TANK & HS-20 LOADS

The R-Tank system is capable of easily supporting AASHTO HS-20 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 crush 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.



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 a standard R-Tank unit (the R-Tank<sup>SD</sup> 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.



## 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.



## HS-20 Loading & LRFD Alternate Loads - Single Lane Traffic

Item	Cover Depth (inches)												
	6	18	20	30	38	48	60	72	84	96	108	120	144
Axle Load (lbs)	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*
Tire Load (lbs)	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 <sup>2</sup> )	200	200	200	200	200	200	200	200	200	200	200	200	200
Area of Applied Load at 33% Angle of Repose (inch <sup>2</sup> )	416	1,064	1,200	2,000	2,784	3,944	5,600	7,544	9,776	12,296	15,104	18,200	25,256
Unmodified Wheel Load Applied to R-Tank	38.46	15.04	13.33	8.00	8.98	6.34	4.46	3.31	2.56	2.03	1.66	1.37	0.99
Impact Factor (per AASHTO Standard)	50.36	19.07	16.82	9.82	10.77	7.38	5.02	3.59	2.66	2.03	1.59	1.26	0.83
Cover Material Pressure at 130 lbs/cf (psi)	0.45	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)	<b>50.81</b>	<b>20.42</b>	<b>18.32</b>	<b>12.07</b>	<b>13.63</b>	<b>11.00</b>	<b>9.53</b>	<b>9.00</b>	<b>8.98</b>	<b>9.26</b>	<b>9.71</b>	<b>10.29</b>	<b>11.66</b>
Capacity of R-Tank Unit (psi)	320.00	42.90	33.40	33.40	33.40	33.40	33.40	33.40	42.90	42.90	42.90	320.00	320.00
Safety Factor	<b>6.30</b>	<b>2.10</b>	<b>1.82</b>	<b>2.77</b>	<b>3.04</b>	<b>3.04</b>	<b>3.50</b>	<b>3.71</b>	<b>4.78</b>	<b>4.64</b>	<b>4.42</b>	<b>31.10</b>	<b>27.44</b>

- R-Tank<sup>HD</sup>
- R-Tank<sup>SD</sup>
- R-Tank<sup>XD</sup>

\*LRFD Alternate Load controls at depths of 38" or more.

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