

R-Tank & HS-20 Loads

TECHNICAL

The R-Tank system is capable of easily supporting AASHTO HS-20 loads with safety factors well above the AASHTO requirement. 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 on an unconfined unit. This type of test yields very conservative results. That's why you won't see similar test results for any of the competitive underground detention/retention systems: they won't hold up under a load without the confining pressure of the backfill. But the R-Tank is different. It's a structural unit that delivers a dependable design load in a testing scenario far worse than any acceptable field application. And this sturdy foundation is just the beginning.

Typical Load Calculation

The AASHTO HS-20 Standard uses a 32,000 lbs axle as the design load. 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 an a conservative 1:2 angle (33%) to determine the Area of Applied Load on the top of the R-Tank
- A dynamic factor is added to account for the movement of the load (1.2)
- 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 following chart shows how the R-Tank performs at various depths of cover. Note that different configurations are specified at different cover depths, and that the Safety Factor never drops below 2.0. In fact, it's often much higher.

While a Safety Factor exceeding 2.0 is already highly conservative, remember that we're comparing the applied load to the strength of the R-Tank as derived from testing in an unconfined condition! Further, all HS-20 installations require the use of a geogrid, which will make the design even more conservative.



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-Tanks and subjected them to brutal testing. One test involved installing a Standard R-Tank with 18" of sand cover (normally we would use the Heavy Duty at this cover depth), no geogrid, and a 31 ton dump truck. 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

Item	Cover Depth [inches]										
	18	24	36	48	60	72	84	96	108	120	168
Axle Load (lbs)	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000
Tire Load (lbs)	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000
Tire Contact Area (10" x 20" = 200 inch ²)	200	200	200	200	200	200	200	200	200	200	200
Area of Applied Load at 33% Angle of Repose (inch ²)	1,064	1,496	2,576	3,944	5,600	7,544	9,776	12,296	15,104	18,200	33,464
Unmodified Wheel Load Applied to R-Tank	15.04	10.70	6.21	4.06	2.86	2.12	1.64	1.30	1.06	0.88	0.48
Live Load Dynamic Safety Factor of 1.2	18.05	12.83	7.45	4.87	3.43	2.55	1.96	1.56	1.27	1.05	0.57
Cover Material Pressure at 130 lbs/cf (psi)	1.35	1.81	2.71	3.61	4.51	5.42	6.32	7.22	8.13	9.03	12.64
Total Load Applied to R-Tank (psi)	19.40	14.64	10.16	8.48	7.94	7.96	8.28	8.78	9.40	10.08	13.21
Ultimate Bearing Capacity of R-Tank Unit (psi)	40.00	30.00	30.00	30.00	30.00	30.00	40.00	40.00	40.00	50.00	50.00
Safety Factor	2.06	2.05	2.95	3.54	3.78	3.77	4.83	4.55	4.26	4.96	3.78

- Standard 4-Plate R-Tank
- Heavy-Duty 5-Plate R-Tank
- Super Duty 5-Plate Half R-Tank



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