MUNICIPAL DEPARTMENT

TESTS OF CEMENT AND CLAY SEWER PIPES.

MR. Max Garry, who was appointed by the International Association for the Testing of Materials to take charge of the investigation of methods of testing sewer pipes of cement and clay, has set forth the results of his investigations in his report published in "Les Materiaux De Construction." In 1895 he investigated, for the German Association of Manufacturers of Portland cement, the methods employed by government, municipalities, and individuals for testing the strength of cement pipes. He found that in Germany, and also in other countries, these tests varied in each case and none were regarded as adequate. Mr. Garry concluded that the tests to be made should determine the following points: The resistance to internal and external pressure; impermeability; resistance to the attack of acids; and the wear and tear upon the interior by sand passing with the water. The tests then should determine mainly the bursting and crushing strength and the texture and composition of the paste used. The most important property in a cement or clay pipe is the resistance to external pressure, for nearly always such pipes are simply covered with earth or sand, and not inclosed in masonry. In passing judgment on the fitness of these pipes it is necessary to distinguish between the loads they are to sustain, for, as some are laid under travelled streets, under railway embankments, or under the foundation walls of buildings, the pressure upon them will differ. Mr. Garry describes the practice of several German cities in testing cement as follows:

The Department of Public Works of Leibnitz requires that a cement pipe one m. (3.28 ft.) in diameter should resist the pressure of a layer of earth 3 m. (9.84 ft.) thick; at Rasenheim, pipes covered with from 12 to 16 in. of earth should resist the pressure of a heavy vehicle; and at Colmar, when there is any doubt of the solidity of a pipe, a loaded waggon is passed over the laid pipe. At Mecklenburg-Schwerin, cement pipes must resist, without cracking, a pressure equal to 50 kg. per lin. m., and per cm. of diameter. This test is made by placing railroad rails on top of the uncovered pipe. The city of Freysing prescribes that the pipe should support a "load of 6,000 kg. concentrated upon the top of a pipe;" and Passau demands that the pipe resist a pressure of 805 lb. per lin. ft. At Zeits, where the pipes are buried from 6 to 12 ft. beneath the surface, a steam road roller is passed over them before acceptance. At Mannheim, clay pipes of 1 m. diam. have been tested by burying them in the earth under a layer 18 in. thick. Over the pipe was then placed a double plank platform measuring 3.28 ft. square and 3 in. thick, and on this was placed the test load. The rupturing load was found to weigh about 28,600 pounds.

For pipes of "armed cement" or cement reinforced by a double iron mesh on the Zisseler system, the engineer of bridges at Bremen prescribes the following test: The pipe is buried in sand in a solid wooden box; then by means of a cover fitting inside the box, a pressure of 7,500 kg. per running m., or about 500 lb. per lin. ft., is applied to the pipe. The pipe is required to stand this pressure without deformation or cracking. For pipes of oval section, 120 by 96 cm. and 6.5 cm. thick, armed with three layers metallic mesh, a uniform load of 9,000 kg. per m., or a little over 600 lb. per ft., is prescribed. At The Hague, Holland, the resistance of cement pipes is determined by placing them in a trench and then loading them uniformly on the square meter of horizontal projection. One pipe in every fifty is subjected to this test; and this load is carried up to 12,000 kg. for pipes 1.5 by 1 m., and 1.2 by 0.8 m. At Copenhagan, Mr. Emanuel Jenson employs a process for testing pipes of clay and of "armed cement" which has given very satisfactory results. A heavy timber is embeded in the soil, carrying on one enda heavy counterweight of cement, and near this are two bars of iron, pierced with holes, attached to the sides of the timber. The pipe to be tested is placed in a strong box, nearly filled with sand and resting upon the timber, and pressure is applied to it by a lever and saddle with a lever support on a pin passing through the holes in the iron bars. The advantage of this process is that the commencement of cracking in the pipe can be noted; though this is of little advantage in the test of clay pipes, as after the appearance of the first crack the pipe will support but little more. But in the case of the Monier and Zisseler construction, where the iron skeleton augments the cohesion of the material, the appearance of the first fissure precedes by some time the final crushing load.

The value of the different kinds of wood for street paving has been demonstrated by an experiment at the King street subway, Toronto, where in November, 1894, blocks were laid in maple, beech, rock elm, soft elm, spruce, red pine, white pine, and cedar. An examination demonstrated the fact that hardwood was the least serviceable, the softer woods being more durable, and cedar the best of all, the latter still being in a comparatively good state of repair, while the hardwoods are badly worn.