

SLAG CORROSION TEST OF REFRACTORIES

Slag attack is particularly important. The structural strength of the refractory may be critically reduced by the solvent action of liquid slags. The slag attack on the refractories in contact may be in the two ways:

Corrosion - It is the wear and tear of refractories caused by static chemical attack of slag.

Erosion - It is wear caused by mechanical action i.e. the process of breaking and washing away of refractory materials by molten slag.

The conditions of operation are variable and complex. Hence the standardization of this test is difficult. However, there are various test methods, viz. Crucible test, Solid cube test, Suspended rod test, Model wall test, Cone test, Powder impact test, but none is exact simulative test. It is done in various ways to suit the working conditions. The following are an outline of different methods of *Slag Corrosion Test* :

=> This method is called 'Pill test' is used when the quantity of slag is less as compared to the quantity of refractories. The slag, more often in the form of a pill, is placed on the refractory body or in a cavity made in it and heated. The depth of penetration of the slag inside the refractory, the spread of the molten mass and also the corrosion or bloating is observed. These factors form the measures of the attack.

=> This is another method known as immersion method and is used when the quantity of the slag is far in excess of refractory. Here the refractory is subjected to attack of the slag by immersing a small piece of refractory in the molten slag. The depth of penetration of the slag inside the refractory is the measures of the attack. => Another test also known as Impingement method or Powder impact test consists of letting the slag fall on the refractory bricks at high temperature. Many a time a spray of solid powdered slag is directed against the hot refractory brick at an angle of 45° for a certain period and at a certain temperature. The extent of corrosion

under gone by the refractory is the measure of the slag attack. Several types of furnaces have been designed for this test.

=> This is Fusion test and consists of making a mixture of different quantities of powdered slag and refractory material and studying the fusion material of the mixture. The interval between softening and flattening of the cone is supposed to indicate the critical range of deformation of refractories in contact with slag.

The extent of penetration of slag is to be carefully studied. The bore diameter, depth in the refractory test specimen, the overall specimen size, fineness, as also the quantity of slag to be tested should be equal in every case for obtaining comparative test results. Overall slag corrosion / erosion will depend on so many factors such as porosity of the refractory brick, the composition, nature of the brick and of the slag, the temperature and duration of the attack, load on the brick at during slag attack, the products of the reaction formed and the rapidity with which they are removed, etc.

Thus various refractories are affected variously and therefore it is difficult to simulate the exact conditions encountered in service. Still one can get an approximate an approximate idea by doing the chemical analysis and studying the various phases developed at the slag-refractory interface through Microstructural and XRD (X-ray diffraction) analysis. Out of all the slag corrosion tests described above, most of which give a qualitative and comparative result only, there is one method which has been somehow accepted as standard is the German DIN 1069 based on crucible test.

Source : <http://viewforyou.blogspot.in/2009/06/slag-corrosion-slag-attack-test-of.html>