



Crushing strength (single pellet and bulk)

CRUSH-BK is an instrument for measuring the crushing strength of solid materials having regular, or almost regular, geometrical shape like spheres, cylinders, rings and similar ones. Their size can be as small as 1 mm, up to 20 mm and even more. The value of crushing strength gives the resistance of the solid to compression, a property of paramount importance not only for industrial catalysts, but also for ceramics, pharmaceutical tablets, etc. In the case of catalysts it is noteworthy that many plant shutdowns occur due to mechanical failure of the catalyst, not to loss of activity. Therefore an accurate and precise measurement of catalyst mechanical properties is always required. CRUSH-BK has been designed on the basis of the ASTM standard method D-4179, referring to single pellet measurements. When the material consists of irregular particles, the latter measurements cannot be performed, but the so-called bulk crushing strength can be evaluated by measuring either the amount of fines produced after compression of a fixed volume of particles at a predetermined pressure or the pressure required for producing a predetermined amount of fines. But even for regular particles the bulk crushing strength is often considered more indicative of the mechanical failure that might be experienced in a catalyst bed during usage. No standard method is available for such test (Ma.Tec. specialists will suggest the best procedure case by case). CRUSH-BK allows to make both single pellet and bulk measurements with the same instrument and without any modification of its parts. The characteristics of CRUSH-BK can vary according to customer's requirements (Ma.Tec. specialists will assist the customer in choosing the instrument more suitable for his materials). Typical characteristics are the following:

- Maximum load 3000 N
- Piston speed 10 mm/min
- Diameter of container for bulk test 40 mm

How many pellets should be tested in single pellet measurements depends on the properties of the material, but a minimum of 20 tests is recommended, while problematic materials might require up to 200 tests. It should be remarked that crushing strength distribution is often more important than the average value, as it is sufficient that only a fraction of the whole batch crushes to give big problems. CRUSH-BK has been designed in order to allow fast operation (2 tests per minute can be done by experienced people).

Several measurements should be done also for bulk crushing strength, because data reproducibility strongly depends on the material. A curve of fines amount vs. applied pressure can be advantageously drawn. Appropriate sample drying is recommended immediately before both single pellet and bulk tests.

CRUSH-BK has a digital display, giving the crushing strength in Newton, and an exit for a 30 mV recorder, where the shape of the crushing peak can be seen. Upon customer's request a machine adapted for connection to PC can be supplied, including a complete software for data treatment.

CRUSH-BK is compliant with the CE specifications.

An instruction manual is supplied with the instrument to assure optimal use of the apparatus. Ma.Tec. specialists are at customer's disposal for any problem arising.