



## **Comparative Impact or Dart Testing of Zip Lock Material**

**Procedure Number: PR- 0PS-QM-QC-008-Org**

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**Synopsis:** This procedure outlines the steps to be followed in testing the dart impact strength of the extruded material used in the manufacture of zip lock bags.

The test procedure is a comparative one, in which the ability of the material to absorb impact energy on those parts of the film exposed to folds and creases is compared with that of the base material of the extruded film.

**Equipment Used:** Dart Impact machine and vacuum pump  
50g dart with combination weight set  
Marking pen  
1000mm and 300mm machine rules  
Marking pen  
Knife  
Recording document

Using the Dart Impact Machine requires dropping a weighted dart from a predetermined height on to the taught, located, surface of plastic film. Be aware that the dart can reflect itself off the test surface and bounce into the immediate proximity of the machine. When using this machine ensure you wear closed shoes and take adequate steps to prevent personal injury or damage to the machine whilst using.

**DO NOT OPERATE THE MACHINE UNLESS YOU HAVE BEEN TRAINED AND ARE COMPETENT TO DO SO.**

**Systems Procedure:** The following procedure is for material which has an opened width dimension of at least 300mm between the zip profiles. Material which is narrower than this needs to be fitted into a carrier window for purposes of testing, and will be discussed in a different procedure.

Obtain a marked, representative sample of the material to be tested



Open the sample into a flat sheet and mark off the required test points at 240mm and 120mm centers, allowing for at least 5 test points of the base material, and 5 test points of that part of the material which has been folded or creased.

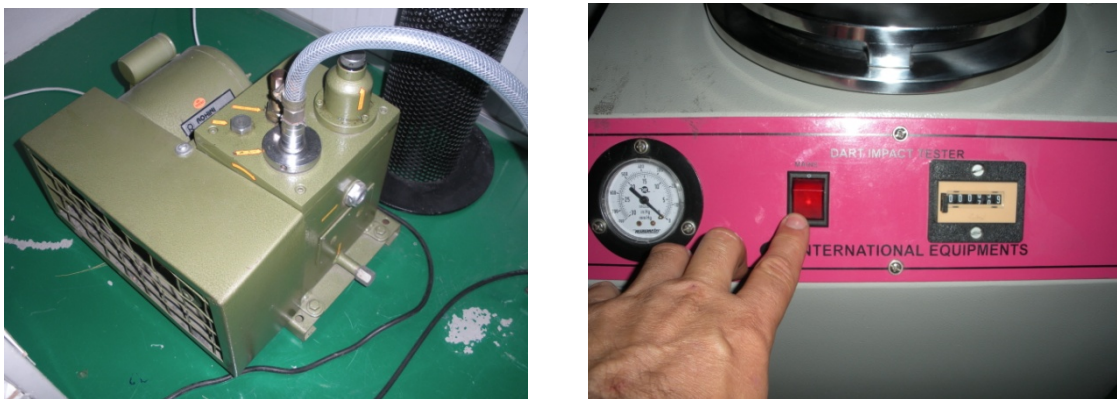


Check the height of the Cross head, as well as its alignment relative to the sample mounting plate in both principal planes.

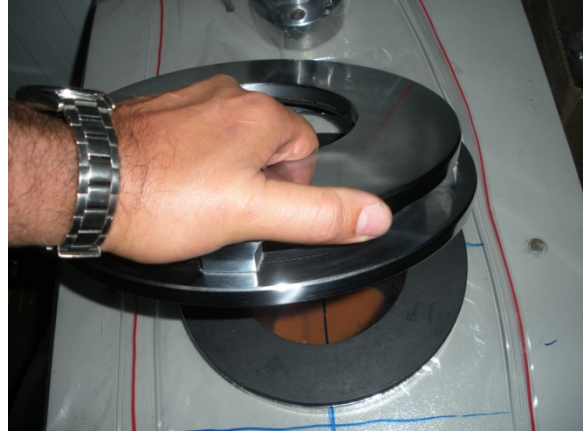
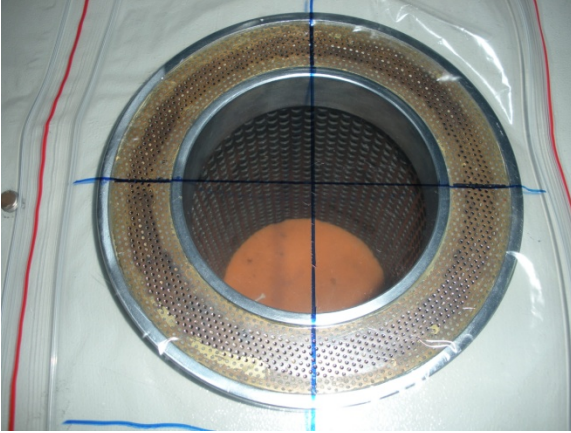


The plum bob needs to be suspended from the centre of the dart clamping unit, using the manufacturer's spigot. The height of the cross head initially needs to be referenced at 600mm from the top of the sample mounting plate for performing comparative tests, and in accordance with ASTM D4272 - 09 for performing absolute tests. Remove the plumb line on completion.

Switch on the machine connected vacuum pump and the dart testing machine



Place a marked sample on the mounting plate, aligning the sample with the alignment marks; lock the sample in place with the locking ring. Initially use a sample point associated with the crease or fold in the material



Fit the 50 gram dart into dart clamping unit.



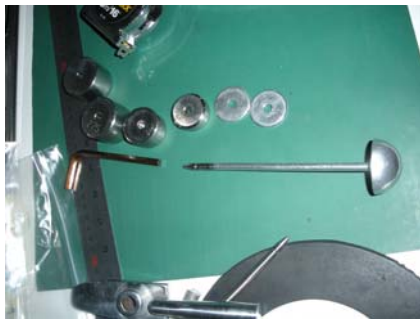
Release the dart by depressing the operating button



Examine the impact point on the film, which should align with the fold or seam of the material.



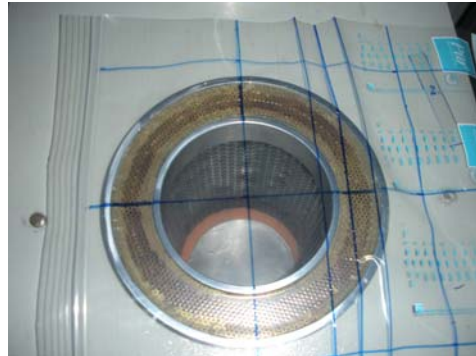
If the material has not broken through as shown in the above photo, the dart impact value is greater than 50 grams. Add additional weight to the dart, move the material to a new test point and repeat the test, continuing the process until the dart breaks the material, but does not pass straight through the material.



If on conducting these tests the material is found to fail catastrophically (i.e. the dart passes straight through the material) at values smaller than the minimum dart mass of 50g, the cross head is to be moved down in increments of 50mm until the 50g dart breaks the material as described previously. Ensure the cross head alignment is accurately referenced to the mounting plate each time it is lowered.



Once the seam impact load has been determined and verified, mount the material sample so that the dart impact point is on the base material.



Perform the same sequence of tests, adding additional weight to dart until it breaks through the material as described previously.



Verify the impact load by performing several tests at the same dart load

Calculate the difference in impact load between the seam and the base material of the sample by using the following equation:

$$\% \text{ Seam Impact Strength} = \frac{\text{Dart weigh in g of seam}}{\text{Dart weigh in g of base materia}} \times 100$$

**Points of Note:** Ideally the ability of the material in the proximity of seams and folds to absorb impact energy should be almost identical to that of the base material. Realistically the structure of the seams and folds interfere with the energy dissipation properties of the material, resulting in its lowered impact energy absorption ability.

This test should always yield values greater than 50%

**Frequency of Test:** To be performed on setting up the job, and at such intervals as may be determined by the QC inspection check list.