



Hegewald & Peschke

Meß- und Prüftechnik GmbH

Application flyer

Determination of the properties of deep drawn sheets

Special testing machines for strip tensile tests, friction tests and draw-bead tests



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Application:

Possible types of tests:

- Tensile tests on the strip
- Friction tests
- Tribological tests
- Draw-bead tests

These special testing machines can be used to determine the abrasion and friction properties of deep-drawn sheets. Such sheets are used, for example, for engine hoods, fenders, doors or pillars. Automobile manufacturers produce body parts like these by automated deep drawing.

General features:

- Regulation of the tensile load and test speed
- Regulation and recording of the holding force
- Control of specimen temperature regulation in the grips and optionally separate specimen pre-temperature regulation below the grips

Draw-Bead-Tests

In order to control the material flow so that the sheet does not crumple or even tear locally during forming, so-called draw beads are incorporated on the drawing edges of the forming tool. They act as brakes and prevent excessive local material flow into the drawing mold. These draw beads are the neuralgic points in the drawing process. They only fulfill their function if optimum friction conditions prevail between them and the sheet. These friction conditions are set by lubricants or coating of the body sheet during production. Galvanized sheet metal has inherent sliding properties that are used during drawing. The measure of friction is the coefficient of friction. It must be determined in order to select the right lubricant or the right coating for a particular sheet. The test method for this is the draw bead test (DBT), in which a sheet specimen is drawn at a defined force and speed through a clamping device equipped with a drawing bead.

Friction tests

By replacing the DBT clamping device with plain clamping jaws without a drawing bead in just a few steps, friction force tests can also be carried out. These involve working with particularly high contact pressure and maximum pull-through speed. The tests are used to test the durability of surface coatings - for example the galvanizing already mentioned - as the forming must not cause any damage to the corrosion protection of the sheets.



Fig. 1. Sheet metal strip after the friction test

High-precision, high-speed thermocouples integrated into the clamping jaws record their temperature change during the test, which is also a measure of the frictional force. Another extra concern is the design of the clamping jaws. Special ball-bearing stops on the edges of the jaws prevent the sheet specimens from deforming during the test due to slightly uneven contact pressure across the jaw cross-section.

Strip tensile tests

In order to carry out tensile tests on the strip, jaws with pyramid toothing, for example, are used, which in turn can be easily exchanged in the grips.





Test parameterization with LabMaster testing software

All relevant parameters for the different types of tests can be set in the H&P testing software LabMaster. Likewise, the regulation of the temperature of the clamping jaws as well as the clamping force is carried out in the software.



Models of the special testing machines for draw-bead tests and friction tests

Item number	41-006-001	41-006-003
Clamping method	Hydraulic	Electromechanical
		
Test stroke	Max. 400 mm	Max. 630 mm
Test speed	1.5 mm/s up to 150 mm/s	0.5 mm/s up to 250 mm/s
Max. specimen dimensions	55 x 4 x 500 [mm]	60 x 5 x 920 [mm]
Acceleration to V_{max}	Within 5 mm	Within 25 mm
Dimensions & Weight		
Machine	1075 x 665 x 2825 [mm], 1200 kg	974 x 640 x 2124 [mm], 950 kg
Control container	800 x 800 x 2100 [mm], 450 kg	800 x 405 x 1900 [mm], 170 kg
Specimen pretempering		
Clamping jaws	yes	yes
Specimen	no	yes, separately controllable via jacketed heating
Clamping tools		
upper	Single sided hydraulic grip (Clamping force: 80 kN)	Motorized screw type wedge action grip (Clamping force: 32 kN)
lower	Draw-bead device with hydraulic servo control	Draw-bead device with electric servo control

