

Maximum Strain



Deep Drawing Cup Test

## Universal Sheet Metal Testing Machine Model 146



Square Deep Drawing Cup Test



Software for  
Control, Adjustment,  
Documentation and Filing  
of Measuring Data

testing equipment for quality management

**ERICHSEN**

**FLC-Test**  
**Bulge-Test**  
**High Speed Test**  
**standardized**

**Extensive**  
**Tools/Accessories**

**With**  
**electro-hydraulic**  
**Drive and PLC**

## Product

The special feature of **Models 145-60 and 145-100** is the increased drawing speed of the drawing punch which, in addition to the normal drawing speed range of 0 – 1200 mm/min can be adjusted, in an infinitely variable manner and independent of load, up to 3000 mm/min. This is achieved by using a separate oil circuit, fed by a pump with high volumetric displacement. Contrary to the high speed attachment based on a nitrogen accumulator, here a constant drawing speed behaviour is guaranteed over the total displacement of 150 mm. As to the technical design and the options available, including PC control and proportional valve technique, this machines are similar to Models 145.

## Application

This Sheet Metal Testing Machine is not only ideal for the effortless, quick and accurate performance of all significant known deep drawing tests for ferrous and non-ferrous metals, it is also designed for a large number of additional technological investigations:

**ERICHSEN Cupping Test** in accordance with

ISO 8490	JIS Z-2247
EN 14-58	JIS Z-7729
EN 14-67	UNI 3037
EN ISO 20482	UNE 7080
BS 3855	GOST 10510
NF A 03-602	ICONTEC 21
NF A 03-652	SIS 11 26 35
ASTM E 643-84	SABS 0132-197
GB 4156-84	

on sheet and strip metal 0.1 to 6.0 mm thick

**ERICHSEN Deep Drawing Cup Test** in accordance with

ISO 11 531	MSZ 5731-68
DIN 50 155	UNI 6124-67
EN 16-69	JIS Z 2249
GB/T 15825	

**Square Cup Test** (40 x 40 mm or 70 x 70 mm)

**Hole Expansion Test (KWI Test)**

**Olsen Cupping Test**

**Persoz Cupping Test**

**Deep Drawing Cup Test acc. to Swift I** (32 mm dia.)

**Deep Drawing Cup Test acc. to Swift II** (50 mm dia.)

**Fukui Test**

**Engelhardt Test**

**Determination of the Forming Limit Curves (FLC)**

**LDH Test**

**High Speed Deep Drawing Cup Test**

**Deep Drawing Tests with Blankholder Quick Release** (for Earing Test)

**Deep Drawing Tests with Preselected Punch Stroke**

**Deep Drawing Test at High Temperatures up to 550 °C/ High Temperature Facility up to 900 °C**

**Deep Drawing Test with PC (incl. software) for data evaluation**

**Bulge Test 50 mm dia. or 100 mm dia.**

**Counter Draw**

**Fine Blanking Test**

**Tensile Test**

**Brinell Hardness Test**

**Lubricant Test**

**Tube Expanding Test** acc. to DIN EN 10234

**Ring Expanding Test** acc. to DIN EN 10236

**ERICHSEN Cupping Test for Lacquer and Paint** in accordance with DIN ISO 1520

**Stamping Lacquer Test and Deep Drawing Cup Test on Coil Coatings**

## Description

The Testing Machine is driven electro-hydraulically. The test sequence is controlled automatically or manually as appropriate. A programme logic controller is used for the functions of the machine (optional computer controls). The drawing force and blankholder force as well as the drawing punch stroke are digitally displayed. The triple-acting hydraulic system in conjunction with the general design results in the following cost saving simplifications:

- ◆ Blanking press in the test head
- ◆ Hydraulic cup ejector
- ◆ Fully-automatic test sequence.

Further technical advantages:

- *Cylinder head with bayonet lock* permitting direct access to drawing dies, blanking rings, blank holders etc. and quick and convenient changing of the drawing and blanking tools
- *Infinitely variable drawing speed* once set it remains constant throughout the drawing movement, independent of any change of load
- *Cardanic drawing die retention* ensures the consistent, parallel clamping of the specimen, independent of variations in thickness.

## Sheetholder Quick Release and Drawing Punch Stop (BSA-ZS)

During the drawing sequence the constant sheet holder force acts on a continuously reducing area of sheet metal under the sheet holder. The result is increasing specific pressure as the remaining flange reduces with the result that in the final phase of the drawing process and especially in cases with severe ear forming tendency, a squashing of the ear-ends will occur. For this reason, provision is made to release the sheet holder pressure completely at a preselected depth where there is no more tendency for folds to form.

The machine is provided with an digital display of the drawing punch stroke and a selector switch for either "BSA" or "ZS". When the depth of draw selected on the digital display unit is reached the drawing punch stops completely - in case of the "ZS" mode, or the sheet holder force is released - in the case of the "BSA" mode.

### Hydraulically lifted test head

Hydraulic test head lifting function (*Fig. 1*) ensures a high rate of working safety and facilitates convenient testing due to the fact that the test head is hydraulically opened and closed.



Fig. 1

### Accessories

#### Hot Drawing Equipment up to 550 °C

A further valuable addition to the possibilities offered by Model 145 is provided by the additional hot drawing equipment (*Fig.2*). In this, the blankholder and drawing die are heated in an insulated container and special provision is made to enable these then to be set up without difficulty on the machine. An electronic temperature measuring device is incorporated, and on this the preset intended temperature and the current measure temperature are displayed. The preset temperature can be set up to 550 °C, and in the test, the temperature remains constant within  $\pm 10$  °C.



Fig. 2

#### High Temperature Facility up to 900 °C

Due to the close co-operation between ERICHSEN with universities, research institutes and the industry, the possibilities of application of sheet metal testing have multiplied.

A high temperature facility (*Fig. 3*) enables to characterize the forming behaviour of metal sheets at up to 900 °C. Contrary to the already existing hot drawing equipment (550 °C), here the test panel is inserted directly into the sheet metal testing machine. By means of a temperature measurement temperature profiles can be established.



Fig. 3

#### Special Applications

This Sheet Metal Testing Machines can be customized and extended to accommodate special requirements (*Fig. 4*), e.g. determination of forming limit curves (FLC) using a 3D.

Generally the sheet metal testing machine will be equipped with proportional technology and difference pressure measuring. As option it is possible to select a PC controls/regulation with software.



Fig. 4

## Universal User Software

The software enables the control, adjustment, documentation and filing of measuring data of the sheet metal testing machine. Software for recording of force-displacement diagrams such as drawing force and blank holder force, stroke. Creation of scripts (test sequences); presetting of freely selectable parameters such as drawing and blank holder force as well as drawing speed.

The measuring system integrated in the sheet metal testing machine is designed in modular system with analogue and digital inputs and outputs. Hereby drawing force, blank holder force and stroke are acquired. The data will be exchanged with the PC via a USB connection. This programme enables to create and evaluate test sequences for tests e.g. Erichsen deep-drawing cup test, bore expanding test, bulge test, Erichsen deep drawing test (only in connection with the proportional valve technique). The scope of supply includes PC, VDU and printer.

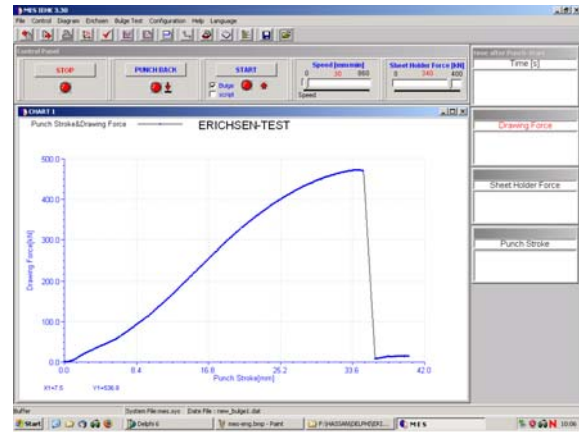


Fig. 5

The Universal Sheet Metal Testing Machines, Models 146, together with the wide range of accessories can be comprehensively adapted to individual requirements. Since due to the tremendous number of different applications our price lists cannot take all conceivable tools and accessories into account, please contact us if you have any special requirements. This will enable us to draw up a quotation according to your specific needs.

## Technical Data

Drawing force	146-60	600 kN
	146-100	1000 kN
Blanking force	146-60	700 kN
	146-100	1000 kN
Blankholder force, max.	146-60	600 kN
	146-100	1000 kN
Drawing punch stroke		approx. 150 mm
Blankholder stroke		approx. 38 mm
Ejector stroke		approx. 150 mm
Drawing punch dia.		up to 100 mm
Blank dia.		up to 220 mm
FLC test (drawing punch dia.)		up to 100 mm
Bulge test (bulge dia.)		up to 100 mm
Drawing speed		approx. 0 - 3000 mm/min

### Digital indicators:

Drawing punch stroke		<b>Resolution:</b> 0.1 mm (on request 0.01 mm)
Drawing force		0.1 kN
Blankholder force		0.1 kN
Mains supply		400 V / 3~, 50/60 Hz (Other voltages upon request)
Power required	146-60	43 kW
Dimensions		1600 x 1300 x 1400 mm (W x D x H)

The right to technical modification is reserved.  
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