

Bore Expanding Test



Deep Drawing Cup Test

Universal Sheet Metal Testing Machine Model 142-Basic



Square Deep Drawing Cup Test



testing equipment for quality management

ERICHSEN
since 1910

Technical Description

**Extensive
Tools / Accessories**

**With
electro-hydraulic Drive
Programme Logic Control**

Product

Universal Sheet Metal Testing Machine with electro-hydraulic drive, fully automatic test sequence and switch off at specimen failure, max. drawing forces 200 kN or 400 kN - **Model 142-20-Basic** and **Model 142-40-Basic**.

Application

This Testing Machine can be used not only to perform effortlessly, quickly and accurately all important and known deep drawing tests for ferrous and non-ferrous metals, but it is also designed for a large number of additional technological investigations:

ERICHSEN Cupping Test in accordance with

EN ISO 20482	JIS Z-2247
NF A 03-602	
NF A 03-652	
ASTM 643	UNE 7080
GB 415607	GOST 10510

ERICHSEN Deep Drawing Cup Test
in accordance with

DIN EN 1669
ISO 11 531
JIS Z 2249
GB/T 15825

on sheet and strips.

Square Cup Test (40 x 40 mm)

Bore Expanding Test (KWI Test)

Bore Expanding Test (ISO 16630)

Determination of the Forming Limit Curves (FLC) (not available for 142-20-Basic)

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

Deep Drawing Test with Preselected Punch Stroke

Deep Drawing Test at High Temperatures up to 550 °C

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

Stamping Lacquer Test and Deep Drawing Cup Test on Coil Coatings

Special Requirements on request.

Description

The **Universal Sheet Metal Testing Machine, Model 142-Basic**, consists of a solid housing made of high-strength steel into which the test aggregate (test cylinder with work piston, sheet holder plate and die) are integrated.



All components are easily accessible from outside the machine, and thus the tools for the individual tests can be changed quickly, too. The clear arranged menu navigation via the touch panel (99 freely programmable programs and tool changes) has password-protected levels, which protect against unauthorized access.



The operating sequence of the testing machine has been designed in such a comfortable manner that cutting of the blank as well as drawing and ejecting of the cup are executed in one single operation.

The Testing Machine is driven electro-hydraulically. The test sequence can be controlled automatically or manually, as desired. A programmable logic controller is used to control the functions of the machine. The "Start" screen displays all required parameters, such as drawing stroke, drawing force and drawing speed. The testing machine is also equipped with an individually adjustable crack detection system.

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 with stop at specimen failure (as of 0.3 mm sheet thickness).

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.
- ◆ *Cardanic retention* ensures the consistent, parallel clamping of the specimen, independent of variations in thickness.

The Sheet Metal Testing Machine, **Model 142-Basic**, was developed for testing as a means for continuous production control using standardised and other established methods.

Additional Control Functions and Test Methods (Options)

Upon request, **Model 142-Basic**, can be equipped with data evaluation system and PC (incl. software pack)
(figure see next page)

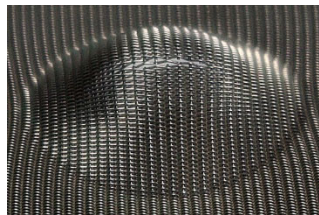


Fig. 1 –
ERICHSEN Cupping Test on metallic tissue

Special insertion device for specimen sheets

allows easy and quick insertion and retraction of the specimen without having to unlock and open the head of the test cylinder



Hot Drawing Equipment up to 550 °C

A further valuable addition to the possibilities offered 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 between 25 °C to 550 °C, and in the test, the temperature remains constant within ± 1 °C.



Fig. 2

HEXRASCAN I / II (Typ II only for Mod. 142-40 Basic)

Camera with traversing bar and lighting, for rupture detection according to ISO 16630 'hole expansion test' (HEXRASCAN I) or for strain measurement on flat sheet metal specimen (e.g. PV 1054) (HEXRASCAN II). An appropriate recording and analysis software is included.



Fig. 3 – HEXRASCAN I

Technical Data

Drawing force	142-20	200 kN
	142-40	400 kN
Blanking force	142-20	265 kN
	142-40	600 kN
Blankholder force	142-20	0.5 - 30 kN
		10 - 100 kN
	142-40	2 - 100 kN
		20 - 220 kN
Drawing punch stroke	142-20	approx. 80 mm
	142-40	approx. 120 mm
Blankholder stroke		approx. 38 mm
Drawing punch dia.	142-20	up to 50 mm
	142-40	up to 75 mm
FLC test (drawing punch- \emptyset)		up to 100 mm
Bulge test (bulge- \emptyset)		up to 100 mm
Blank diameter	142-20	up to 120 mm
	142-40	approx. 170 mm
Drawing speed		approx. 500 mm/min
Digital displays		Resolution:
Drawing punch stroke		0.1 mm
Drawing force		0.1 kN
Blankholder force		0.1 kN
Mains supply		400 V / 3 ~, 50 Hz (other voltages on request)
Power required	142-20	approx. 3.4 kW
	142-40	approx. 8.4 kW
Dimensions (W x D x H)		approx. 810 x 1100 x 1320 mm
Weight, net	142-20	approx. 550 kg
	142-40	approx. 1100 kg
Working material		approx. 95 l hydraulic oil (HLP 32 ISO) - must be provided by the user

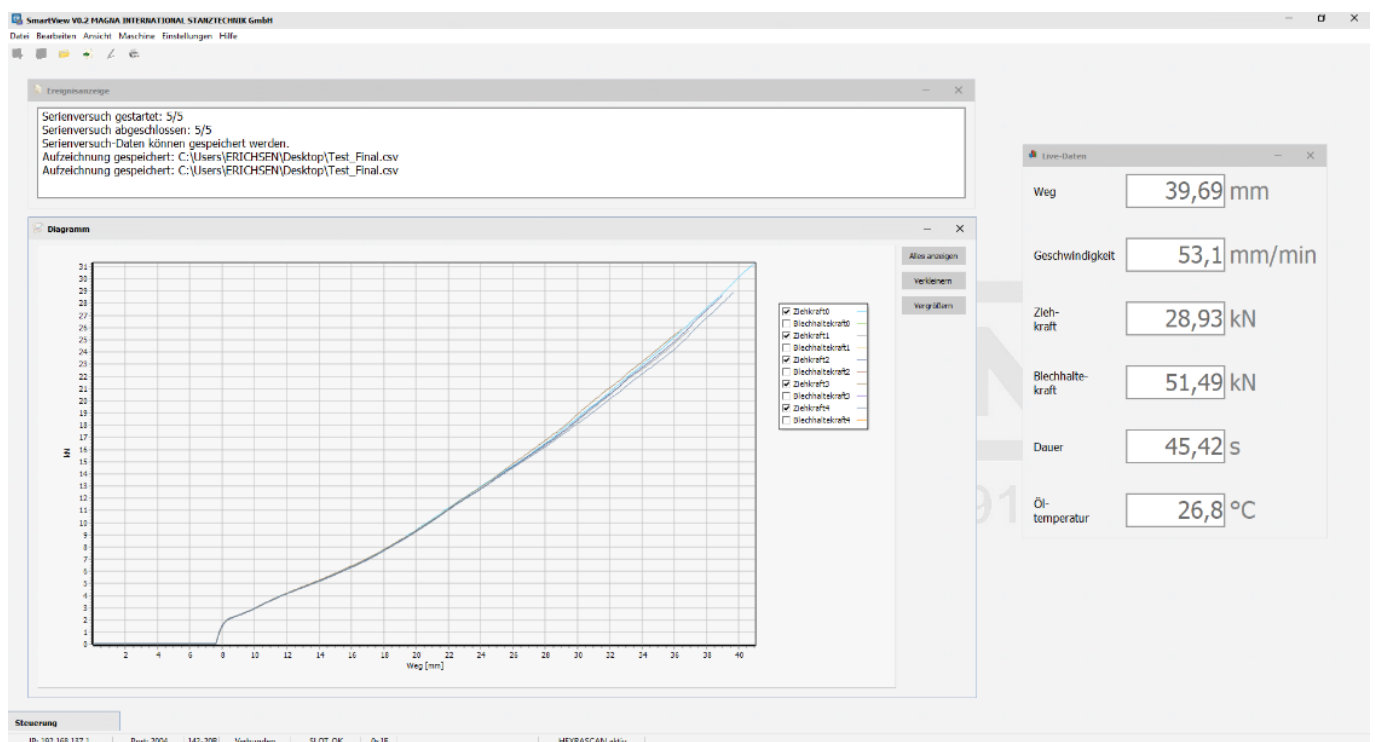
For the ERICHSEN Cupping Test and other test specifications a user test software is available as option:

The ERICHSEN Cupping Test (in accordance with EN ISO 20482, and corresponding to national and international standards) is a test providing simple and quick means of assessing the multi-axis ductility of sheet and strip using a procedure that relates closely to practical processes. The depth range reached at failure is, however, only an initial guide to the evaluation of the forming properties of the sheet metal.

From the Universal Sheet Testing Machine, **Model 142-Basic**, (as is the case with all the modern electro-hydraulic ERICHSEN Testing Machines) the data from the analogue outputs for

- ◆ drawing punch movement,
- ◆ drawing force, and
- ◆ blankholder force,

are sent to an amplifier with A/D converter. These components are connected via USB port to a computer. The graph of the force/displacement diagram will be displayed on the VDU.



Data Evaluation System with User Test Software SmartView

The software enables the continuous acquisition of measured values with simultaneous display of the force/displacement diagram throughout the forming process. The data recording will be stopped after the maximum force is achieved in a cupping test or the deep draw test is finished. The connection is made by an Ethernet connection.

This data is presented immediately on the VDU on completion of the test alongside the graph of the force against displacement.

The software included in the scope of supply runs under WIN 10. Either a printout can then be obtained and the data saved or the data can be easily transferred to other evaluation programmes (e.g. Microsoft Excel).

The scope of supply includes PC, VDU and printer.

**Selection table for drawing dies B1/C2
(#01370132)**

valid for **ferrous and non-ferrous** material
(material type necessary for order)

Norm: ERICHSEN

Var.	Thickness s / mm	Var.	Thickness s / mm
1	0,076	28	0,85
2	0,100	29	0,90
3	0,127	30	0,95
4	0,13	31	1,00
5	0,14	32	1,10
6	0,15	33	1,15
7	0,18	34	1,20
8	0,20	35	1,25
9	0,21	36	1,30
10	0,23	37	1,40
11	0,24	38	1,50
12	0,25	39	1,60
13	0,26	40	1,70
14	0,27	41	1,80
15	0,28	42	1,90
16	0,30	43	2,00
17	0,32	44	2,10
18	0,35	45	2,20
19	0,40	46	2,30
20	0,45	47	2,40
21	0,50	48	2,50
22	0,55	49	2,60
23	0,60	50	2,65
24	0,65	51	2,70
25	0,70	52	2,8
26	0,75	53	2,9
27	0,80	54	3,0

**Selection table for drawing dies B1/C2
(#01370132)**

valid for **aluminium and aluminium alloy**
Norm: DIN EN 1669

valid for Clearance ratio 1,15 bis 1,52		valid for Clearance ratio 1,34 bis 1,76	
Var.	Thickness s / mm	Var.	Thickness s / mm
1	0,095 < s ≤ 0,120	1	0,080 < s ≤ 0,100
2	0,121 < s ≤ 0,150	2	0,101 < s ≤ 0,125
3	0,151 < s ≤ 0,185	3	0,126 < s ≤ 0,157
4	0,186 < s ≤ 0,235	4	0,158 < s ≤ 0,195
5	0,236 < s ≤ 0,280	5	0,196 < s ≤ 0,240
6	0,281 < s ≤ 0,345	6	0,241 < s ≤ 0,290
7	0,346 < s ≤ 0,435	7	0,291 < s ≤ 0,360
8	0,436 < s ≤ 0,535	8	0,361 < s ≤ 0,450
9	0,536 < s ≤ 0,665	9	0,451 < s ≤ 0,555
10	0,666 < s ≤ 0,800	10	0,556 < s ≤ 0,670
11	0,801 < s ≤ 0,940	11	0,671 < s ≤ 0,800
12	0,941 < s ≤ 1,130	12	0,801 < s ≤ 0,965
13	1,131 < s ≤ 1,450	13	0,966 < s ≤ 1,250
14	1,451 < s ≤ 1,900	14	1,251 < s ≤ 1,600
15	1,901 < s ≤ 2,350	15	1,601 < s ≤ 2,000
16	2,351 < s ≤ 2,900	16	2,001 < s ≤ 2,400
17	2,901 < s ≤ 3,500	17	2,401 < s ≤ 3,000

**Selection table for drawing dies B1/C2
(#01370132)**

valid for **ferrous and non-ferrous** material
(material type necessary for order)

Norm: ISO 11531

Var.	Thickness s / mm	Var.	Thickness s / mm
1	0,1 < s ≤ 0,2	4	0,8 < s ≤ 1,6
2	0,2 < s ≤ 0,4	5	1,6 < s ≤ 3,0
3	0,4 < s ≤ 0,8		

**Selection table for drawing dies C1
(#01410132)**

valid for **ferrous and non-ferrous** material
(material type necessary for order)

Norm: ERICHSEN

Var.	Thickness s / mm	Var.	Thickness s / mm
1	0,076	28	0,85
2	0,100	29	0,90
3	0,127	30	0,95
4	0,13	31	1,00
5	0,14	32	1,10
6	0,15	33	1,15
7	0,18	34	1,20
8	0,20	35	1,25
9	0,21	36	1,30
10	0,23	37	1,40
11	0,24	38	1,50
12	0,25	39	1,60
13	0,26	40	1,70
14	0,27	41	1,80
15	0,28	42	1,90
16	0,30	43	2,00
17	0,32	44	2,10
18	0,35	45	2,20
19	0,40	46	2,30
20	0,45	47	2,40
21	0,50	48	2,50
22	0,55	49	2,60
23	0,60	50	2,65
24	0,65	51	2,70
25	0,70	52	2,8
26	0,75	53	2,9
27	0,80	54	3,0

**Selection table for drawing dies B2/C3
(#01430132)**

valid for **ferrous and non-ferrous** material
(material type necessary for order)

Norm: ERICHSEN

Var.	Thickness s / mm	Var.	Thickness s / mm
1	0,076	43	2,00
2	0,100	44	2,10
3	0,127	45	2,20
4	0,13	46	2,30
5	0,14	47	2,40
6	0,15	48	2,50
7	0,18	49	2,60
8	0,20	50	2,65
9	0,21	51	2,70
10	0,23	52	2,8
11	0,24	53	2,9
12	0,25	54	3,0
13	0,26	55	3,1
14	0,27	56	3,2
15	0,28	57	3,3
16	0,30	58	3,4
17	0,32	59	3,5
18	0,35	60	3,6
19	0,40	61	3,7
20	0,45	62	3,8
21	0,50	63	3,9
22	0,55	64	4,0
23	0,60	65	4,1
24	0,65	66	4,2
25	0,70	67	4,3
26	0,75	68	4,4
27	0,80	69	4,5
28	0,85	70	4,6
29	0,90	71	4,7
30	0,95	72	4,8
31	1,00	73	4,9
32	1,10	74	5,0
33	1,15	75	5,1
34	1,20	76	5,2
35	1,25	77	5,3
36	1,30	78	5,4
37	1,40	79	5,5
38	1,50	80	5,6
39	1,60	81	5,7
40	1,70	82	5,8
41	1,80	83	5,9
42	1,90	84	6,0

**Selection table for drawing dies B2/C3
(#01430132)**

valid for **aluminium and aluminium alloy**
Norm: DIN EN 1669

gültig für Clearance ratio 1,15 bis 1,52		gültig für Clearance ratio 1,34 bis 1,76	
Var.	Blechdicke s / mm	Var.	Blechdicke s / mm
1	3,501 < s ≤ 4,100	1	3,001 < s ≤ 3,500
2	4,101 < s ≤ 5,000	2	3,501 < s ≤ 4,400
3	5,001 < s ≤ 6,000	3	4,401 < s ≤ 5,300

**Selection table for drawing dies B2/C3
(#01430132)**

valid for **ferrous and non-ferrous** material
(material type necessary for order)
Norm: ISO 11531

Var.	Blechdicke s / mm	Var.	Blechdicke s / mm
1	0,1 < s ≤ 0,2	4	0,8 < s ≤ 1,6
2	0,2 < s ≤ 0,4	5	1,6 < s ≤ 3,0
3	0,4 < s ≤ 0,8		

**Selection table for drawing dies B3/C4
(#01480132)**

valid for **ferrous and non-ferrous** material
(material type necessary for order)
Norm: ERICHSEN
(only for model 142-40-Basic)

Var.	Blechdicke s / mm	Var.	Blechdicke s / mm
1	0,076	31	1,00
2	0,100	32	1,10
3	0,127	33	1,15
4	0,13	34	1,20
5	0,14	35	1,25
6	0,15	36	1,30
7	0,18	37	1,40
8	0,20	38	1,50
9	0,21	39	1,60
10	0,23	40	1,70
11	0,24	41	1,80
12	0,25	42	1,90
13	0,26	43	2,00
14	0,27	44	2,10
15	0,28	45	2,20
16	0,30	46	2,30
17	0,32	47	2,40
18	0,35	48	2,50
19	0,40	49	2,60
20	0,45	50	2,65
21	0,50	51	2,70
22	0,55	52	2,8
23	0,60	53	2,9
24	0,65	54	3,0
25	0,70	55	3,1
26	0,75	56	3,2
27	0,80	57	3,3
28	0,85	58	3,4
29	0,90	59	3,5
30	0,95		

Selection table for drawing dies for square cups 40x40 (#01530132)

valid for **ferrous and non-ferrous** material
(material type necessary for order)
Norm: ERICHSEN

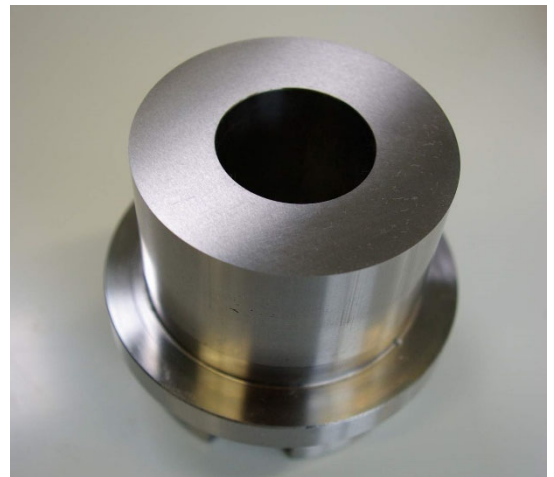
Var.	Blechdicke s / mm	Var.	Blechdicke s / mm
1	0,10	20	0,85
2	0,15	21	0,90
3	0,20	22	0,95
4	0,22	23	1,00
5	0,23	24	1,10
6	0,24	25	1,20
7	0,25	26	1,25
8	0,26	27	1,30
9	0,30	28	1,40
10	0,35	29	1,50
11	0,40	30	1,60
12	0,45	31	1,70
13	0,50	32	1,80
14	0,55	33	1,90
15	0,60	34	2,00
16	0,65	35	2,30
17	0,70	36	2,50
18	0,75	37	2,60
19	0,80	38	3,00

Selection table for blanking die ring (#08690132)

valid for **ferrous and non-ferrous** material
Norm: ISO 16630

Var.	Blechdicke s / mm	Var.	Blechdicke s / mm
1	$1,2 \leq s < 1,5$	7	$3,6 \leq s < 4,0$
2	$1,5 \leq s < 1,9$	8	$4,0 \leq s < 4,4$
3	$1,9 \leq s < 2,3$	9	$4,4 \leq s < 4,8$
4	$2,3 \leq s < 2,7$	10	$4,8 \leq s < 5,2$
5	$2,7 \leq s < 3,1$	11	$5,2 \leq s < 5,7$
6	$3,1 \leq s < 3,6$	12	$5,7 \leq s < 6,0$

Selection table for blanking tools



Blanking tool for deep-drawing cups blank cut with punch dia 33 mm (B1):

- consists of blanking die ring (# 01380132) and blanking punch (01390132)

for ferrous material:

- 55 – 80 mm
- 64 mm recommended
- ISO 11531 approx. 60 mm

for non-ferrous material:

- DIN EN 1669 / 60 or 64 mm

Punching areas for sheet thicknesses of ferrous materials:

- 0,2 – 1,0 mm
- 1,1 – 2,5 mm

Punching areas for sheet thicknesses of non-ferrous materials:

- 0,1 – 0,59 mm
- 0,6 – 1,69 mm
- 1,7 – 3,0 mm
-

Blanking tool for deep-drawing cups blank cut with punch dia 50 mm (B2):

- consists of blanking die ring (# 01440132) and blanking punch (01450132)

for ferrous material:

- 81 - 120 mm
- 90 mm recommended
- Square cups 40 x 40 approx. 85 mm (blanking punch # 04190132)

Punching areas for sheet thicknesses of ferrous materials:

- 0,2 – 1,0 mm
- 1,1 – 2,0 mm
- 2,1 – 4,0 mm
- 4,1 – 6,0 mm

Punching areas for sheet thicknesses of non-ferrous materials:

- 0,1 – 0,59 mm
- 0,6 – 1,69 mm
- 1,7 – 3,0 mm

**Blanking tool for deep-drawing cups blank cut with punch dia 75 mm (B3):
(only for model 142-40 Basic)**

- consists of blanking die ring (# 01490132) and blanking punch (01500132)

for ferrous material:

- 121 - 170 mm
- 90 mm recommended
- Square cups 40 x 40 approx. 85 mm (blanking punch # 04190132)

Punching areas for sheet thicknesses of ferrous materials:

- 0,2 – 1,0 mm
- 1,1 – 2,0 mm
- 2,1 – 4,0 mm
- 4,1 – 6,0 mm

Punching areas for sheet thicknesses of non-ferrous materials:

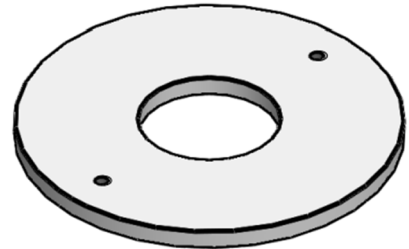
- 0,1 – 0,59 mm
- 0,6 – 1,69 mm
- 1,7 – 3,0 mm

Wiper rings:

Model 142-20 Basic

Wiper ring (# 30720032) for a specific punching area:

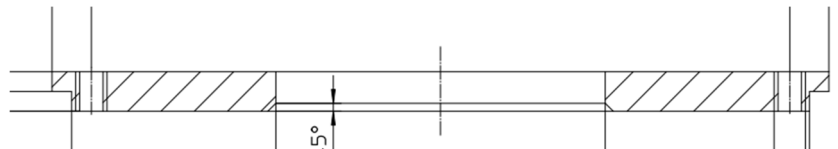
- Ø 50-55mm
- Ø 55-67mm
- Ø 68-80mm
- Ø 80-100mm
- Ø 101-120mm



Model 142-40 Basic

Wiper ring (# 30730032) for a specific punching area:

- Ø 55-67mm
- Ø 67-80mm
- Ø 80-100mm
- Ø 100-120mm
- Ø 120-130mm
- Ø 130-140mm
- Ø 140-150mm
- Ø 150-160mm
- Ø 160-170mm



Further Universal Sheet Metal Testing Machines supplied by ERICHSEN:

Electro-hydraulically driven Sheet Metal Testing Machine with Automatic Controls – Model 134
(drawing force 120 kN)



Universal Sheet Metal Testing Machine with Automatic Test Sequence - Model 142
(drawing force 200 kN or 400 kN)



Universal Sheet Metal Testing Machine with Automatic Test Sequence - Model 145-60 Basic
(drawing force 600 kN) – *compact design*

Universal Sheet Metal Testing Machine for Research and Development - Model 145
(drawing force 600 kN or 1000 kN)

Universal Sheet Metal Testing Machine for Research, Development and In-process Testing - Model 146
(drawing force 600 kN or 1000 kN)

