Special Metals Testing Machine SP

The straightforward machine ...

... for metals testing

PI 291 2.0800.102

SP Machine Concept

Zwick has designed the hydraulic Special Metals Testing Machine SP in the range from 400 to 2000 kN especially for Quality Control on concrete reinforcement steel.

Basic SP Machine: Load Frame including wedge grips

The SP machine is equipped with hydraulically supported or manual wedge grips as well as a hydraulic power pack.

Depending on the nominal force of the machine the basic construction is designed with two or four columns to ensure high stiffness of the machine configuration.

Fig. 01: Zwick SP600 load frame; 2 columns, crosshead fixed

Fig. 02: Zwick SP2000 load frame; 4 columns, adjustable crosshead

Fig. 03: Zwick SP600 load frame with fixed crosshead

Each machine is available with a fixed and with a movable, upper crosshead. Fig. 03 shows a fixed upper crosshead.

This kind of SP machine offers a special advantage: the long test stroke even meets the extreme requirements of JIS G 3112 and BS 4449. It can be used for the most varied International Standard requirements without time consuming adjustments of the upper crosshead.

Fig. 04: Zwick SP600 load frame with adjustable crosshead

In special cases (e.g. extreme gripping lengths), the machine can be delivered with an optional manually adjustable upper crosshead (see Fig. 04).

Load Frames 400 and 600 kN - Two Columns

2 Columns Load Frame	
Type	**Fmax**
SP400	400 kN
SP600	600 kN

Table 1: SP Machines 400 kN and 600 kN (2 columns)

* Long test stroke for testing various specimen lengths. Stroke of the hydraulic actuator of machines with two columns: 500 mm
* Optional: Adjustable crosshead with manual clamping
* High stiffness of the machine due to a rigid load frame and axial force guidance

Load Frames 1000 - 2000 kN - Four Columns

4 Columns Load Frame	
Type	**Fmax**
SP1000	1000 kN
SP1200	1200 kN
SP1500	1500 kN
SP2000	2000 kN

Table 2: SP Machines 1000 kN up to 2000 kN (4 columns)

* Long test stroke for testing various specimen lengths. Stroke of the hydraulic actuator of machines with four columns: 600 mm
* Optional: Adjustable crosshead with manual clamping
* High stiffness of the machine due to a rigid load frame and axial force guidance

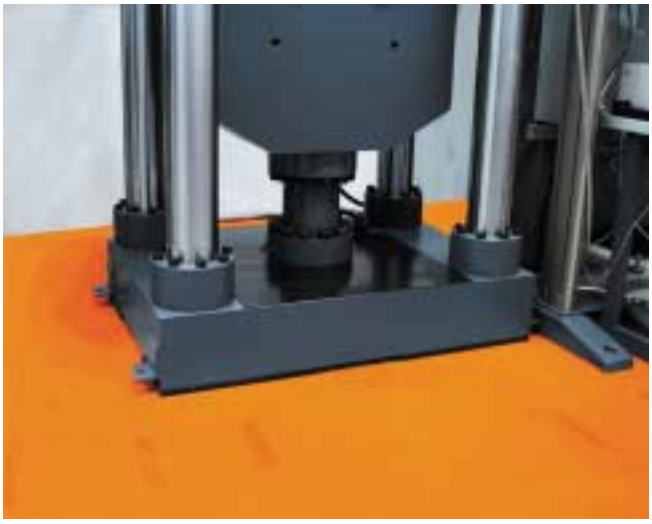

Fig. 05: SP Machines do not require foundations

Important Notes:
NO FOUNDATIONS are required for installing and operating the Zwick SP machine

Electronic load cell included in basic configuration (see Option 2)

Option 1: Water Heat Exchanger

* Instead of an air cooling system, a water heat exchanger for the hydraulic power supply is available (e.g. for laboratories where constant temperature is necessary)
* Also recommended for environment temperature starting at 35°C
* Free of charge

Fig. 06: Optional water heat exchanger

Option 2: Electronic Load Cell

An electronic load cell is part of the scope of delivery for all models. The accuracy of the load cell is +/- 1% of reading from 1/250 to the maximum of the load cell capacity (see Table 3).

Load cell specifications for SP machines	
Machine (Fmax)	**Load Cell (Accuracy +/- 1%)**
SP400 (400 kN)	1.6 ... 400 kN
SP600 (600 kN)	2.4 ... 600 kN
SP1000 (1000 kN)	4 ... 1000 kN
SP1200 (1200 kN)	4.8 ... 1200 kN
SP1500 (1500 kN)	6 ... 1500 kN
SP2000 (2000 kN)	8 ... 2000 kN

Table 3: Overview of load cells for SP Machines

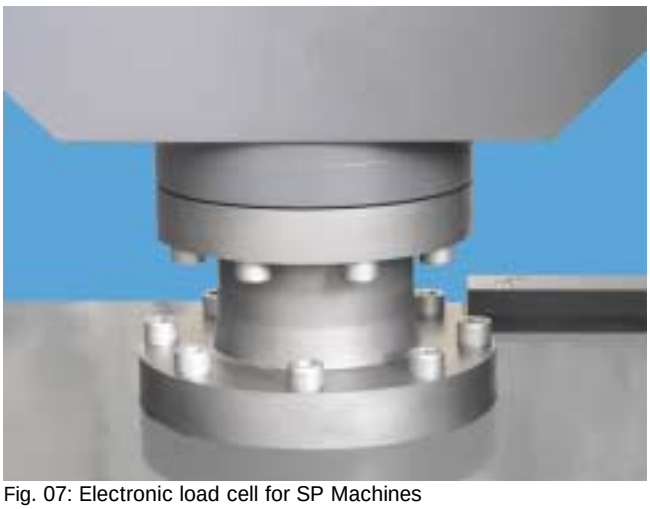

Fig. 07: Electronic load cell for SP Machines

Option 3:
Easy-to-change Jaw Faces

Jaw faces can be chosen depending on the shape and dimensions of the samples (see Table 4).

	Overview Jaw Faces for SP Machine					
	SP400 (Fmax 400 kN)	SP600 (Fmax 600 kN)	SP1000 (Fmax 1000 kN)	SP1200 (Fmax 1200 kN)	SP1500 (Fmax 1500 kN)	SP2000 (Fmax 2000 kN)
Flat Samples	0 ... 16 mm B8511.00.11	0 ... 16 mm B8521.00.11	0 ... 20 mm B8531.00.11	0 ... 20 mm B8532.00.11	0 ... 20 mm B8541.00.11	0 ... 20 mm B8542.00.11
	16 ... 32 mm B8511.00.12	16 ... 32 mm B8521.00.12	20 ... 40 mm B8531.00.12	20 ... 40 mm B8532.00.12	20 ... 40 mm B8541.00.12	20 ... 40 mm B8542.00.12
	32 ... 50 mm B8511.00.13	32 ... 50 mm B8521.00.13	40 ... 60 mm B8531.00.13	40 ... 60 mm B8532.00.13	40 ... 60 mm B8541.00.13	40 ... 60 mm B8542.00.13
	---	---	---	---	60 ... 70 mm B8541.00.14	60 ... 70 mm B8542.00.14
Round Samples	5 ... 20 mm B8511.00.14	5 ... 20 mm B8521.00.14	5 ... 20 mm B8531.00.15	5 ... 20 mm B8532.00.15	5 ... 20 mm B8541.00.15	10 ... 20 mm B8542.00.15
	20 ... 30 mm B8511.00.16	20 ... 30 mm B8521.00.16	20 ... 30 mm B8531.00.17	20 ... 30 mm B8532.00.17	20 ... 30 mm B8541.00.17	20 ... 30 mm B8542.00.16
	30 ... 40 mm B8511.00.17	30 ... 40 mm B8521.00.17	30 ... 40 mm B8531.00.18	30 ... 40 mm B8532.00.18	30 ... 40 mm B8541.00.18	30 ... 40 mm B8542.00.17
	---	---	40 ... 52 mm B8531.00.19	40 ... 52 mm B8532.00.19	40 ... 52 mm B8541.00.19	40 ... 52 mm B8542.00.18
	---	---	52 ... 65 mm B8531.00.20	52 ... 65 mm B8532.00.20	52 ... 65 mm B8541.00.20	52 ... 65 mm B8542.00.19

Table 4: Overview of available jaw faces for SP Machines

Fig. 08: Easy jaw face exchange

Fig. 09: Jaw faces are fixed with two screws

Option 4.1
Extensometer Macro

The optional SP-extensometer Macro can be provided for direct strain measurement on the specimen with a variable, initial gauge length.

It consists of three items: the extensometer itself, the optional drive unit for opening and closing the sensor arms and a pair of sensor arms.

The Macro extensometer has the following features and advantages:

* Determination of the measurement values according to international Standards (EN, BS, JIS, ISO)
* Strain measurement with middle strain rate
* Deformation is recorded directly at the specimen in the elastic and plastic ranges during the entire tensile test up to specimen break
* Tiltable knife edges that help to avoid damage to the sensor arms, and to the knife edges themselves, at specimen break
* Can be used for both flat and round specimens
* Accuracy grade 1 according to DIN EN 10002 T4

Special sensor arms are available to cover measurements on large dimensioned specimen (thickness, diameter). They are suitable for sizes up to 110 mm. As shown in the two pictures below, these sensor arms can be used with a large range of specimen dimensions (see Fig. 11+12).

Fig. 10: Zwick extensometer Macro for SP Machine (BSP066551.02)

Fig. 11: Sensor arms for SP-Macro for sample diameter / thickness up to 110 mm (example with large diameter, BSP066550.20-003)

Fig. 12: Sensor arms for SP-Macro for sample diameter / thickness up to 110 mm (example with small diameter, BSP066550.20-003)

Option 4.2
Extensometer Digital Clip-On

An incremental 'Clip-On' extensometer is available as an alternative to the Macro extensometer. It is clipped to the sample before starting the test and removed before break. Fig. 13 shows the standard version of the 'Clip-On'.

Corresponding extension pieces are available for specimen diameters up to 70 mm (see Fig. 14).

The incremental 'Clip-On'-extensometer has the following features and advantages:

* Fine strain measurement and determination of the measurement values according to international Standards (EN, BS, JIS, ISO)
* The patented incremental measurement system makes this clip-on extensometer an extremely powerful and value for money variation of extension measurement
* The incremental clip-on extensometer is the only clip-on extensometer with an adjustable measurement range, thus making it possible to utilise the measurement path to an optimum for both tensile and compression tests
* The low overall height can also be used for small grip to grip separations
* Automatic centering of round specimens.
* The initial gauge length is automatically interlocked when clipping it onto the specimen, and is released when detaching it from the specimen.

Fig. 13: Zwick extensometer Digital Clip-On for SP Machine

Fig. 14: Zwick extensometer Digital Clip-On with extension pieces for large diameters

Note:
Two different elongation measurement options are available for the SP-Machine:

*** Macro extensometer with sensor arms (Can stay on specimen up to break)**
*** Clip-On Extensometer (Must be manually clipped-on specimen before test and removed before break)**

Open front type grips

Both the upper and lower specimen grips have an open front type design.

The advantages are:

* Simplified loading and unloading of specimen
* Easy exchange of jaw inserts by one person only

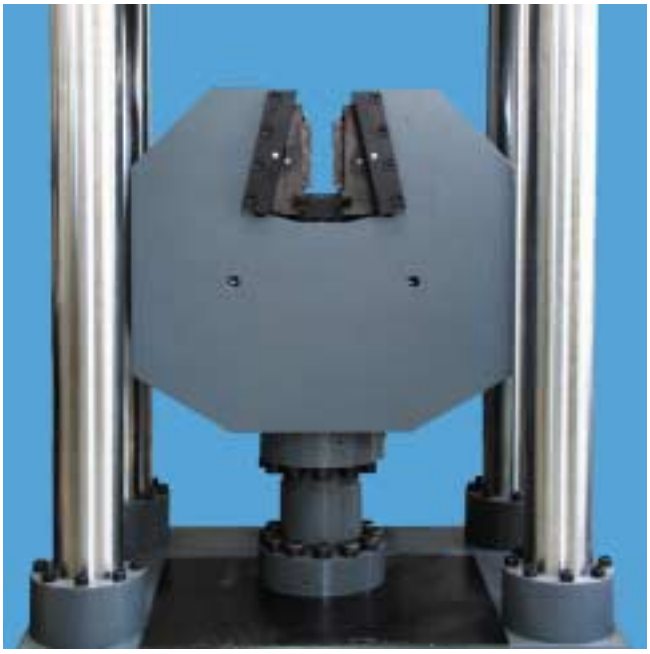

Fig. 15: Lower grips 2000 kN with open front design

Option 5.1
Compression platen for compression tests

A testing kit according to BS, ISO, JIS and other standards is available for compression tests. It's mounted directly on the wedge grips, which can be left in the machine.

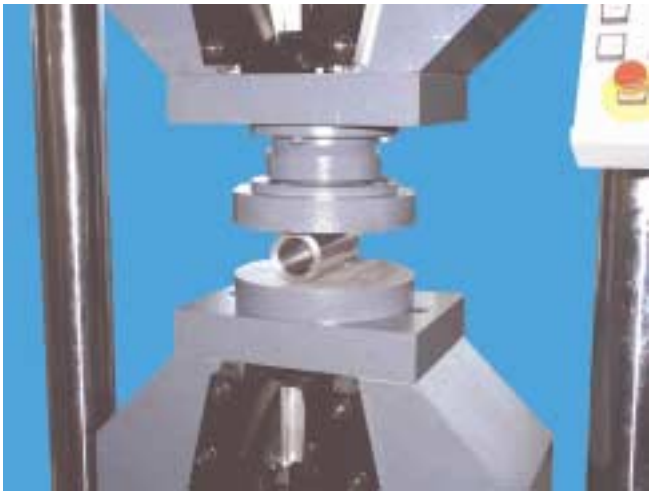

Fig. 16: Compression platens for performing compression tests

Option 5.2
Bending kits for bending tests

A kit according to BS, ISO, JIS and other standard is available for additional bending tests. Like the compression unit, it is also mounted on the grips, which of course can also be left in the machine.

A selection of international Standards covered by the Zwick SP-Machine is:

* EN 910
* DIN 50111
* ISO 7438
* JIS Z 2248

Fig. 17: Zwick SP400 with unit for performing bending tests

Option 6:
Toolkit for SP Machine

A pair of T-slot mountings according to DIN 51301 to adapt a calibration tool (supplied by the user) is optional. They are inserted into the grips from the front.

Fig. 18: Calibration mounting for SP Machine

Option 7:
Safety shield for SP Machine

Two kinds of safety shields are available.

The first one is electrically connected to the machine and provides protection on all four sides of the machine. The testing area can be accessed via an electrically lockable door.

A second one is an easy-to-handle shield which is freely movable on rollers without connection to the machine. This easy-to-handle shield is a screen mounted on four wheels which can be placed between the user and the machine for protection.

Please note that this second shield does not fulfil the CE-requirements, but is accepted in several non CE countries.

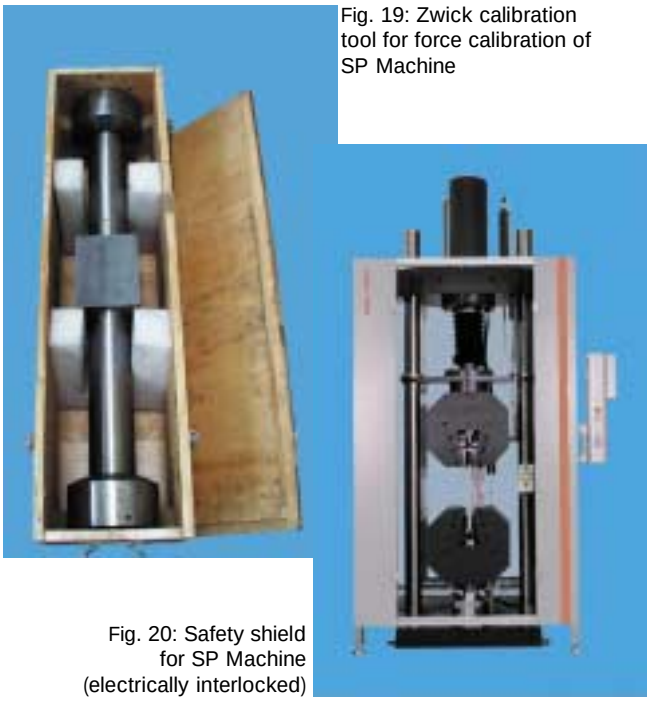

Fig. 19: Zwick calibration tool for force calibration of SP Machine

Fig. 20: Safety shield for SP Machine (electrically interlocked)

Option X:
User Software Zwick testXpert

The SP series is controlled with the Zwick testXpert test software running under Windows 95/98/2000 and NT.

The main advantage of this software is the easy performance of standard tests by autorun operation. The operation on the PC is reduced to a single-button operation. All further steps are carried out automatically by the test software.

Fig. 21: Zwick testXpert test program - test graphics

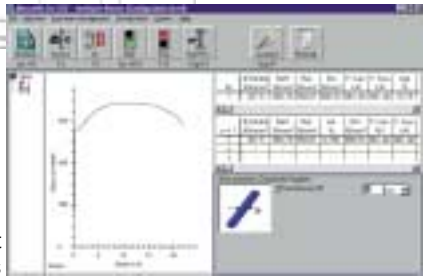

Fig. 22: Zwick testXpert test program - test series

Final Steps:
Packing and Shipment of Zwick SP-Machine

Different types of packings are available for the SP-Machine: for shipment by truck one-way packing is enough. Also if the machine is carried on via seaport by ship in a container (see below).

Packing in crates is also available. The whole machine is covered by wooden boards to protect it.

Fig. 23: SP2000 on truck to be shipped by air-freight

Installation of the SP-Machine

The installation of the machine at the customer's site is either performed by a local Zwick service engineer or by one of his colleagues from Germany.

If requested, Zwick can also provide additional training for the operators on site, or can provide an introduction to the materials testing machine and the software.