Creep Compression Testing Machines
F-ECH series

MICROTEST

MICROTEST, S.A.
Instruments and Equipments for Materials Testing
(+34) 91 796 33 32 www.microtest-sa.com

INTRODUCTION

MICROTEST F-ECH hydraulic Testing machines are designed to perform creep compression test on concrete, rock, soil or new material samples,
The duration of this type of tests ranges from days to several years.
They are built in capacities ranging from **100kN to 5000kN** or more, under demand.
These machines are designed not only to fulfill the requirements of standard tests but also the specifications related with research in mechanical properties of new materials.
In F-ECH systems, the load is applied by means of a hydraulic cylinder in a two or four columns high stiffness testing frame.
The system includes an integrated load maintaining system by means of a pressure N_2 accumulator system. This hydro-pneumatic device allows a high stability of the applied force during long periods of time.
The system includes load measurement by means of a precision pressure transducer or integrated load cell. The deformation of the samples during the test can be measured and recorded in different ways, depending on the test and sample. For instance, the strain can be measured by strain gages bonded to the sample or by using MT-EXT-HOR extensometers or DDM attached to the sample.
MICROTEST provides the suitable measuring system for each application.

GENERAL DESCRIPTION F-ECH

In F-ECH system, the load is applied by means of a hydraulic cylinder in two, three or four columns, high stiffness testing frame. The system is capable of maintaining the applied load for long periods of time with a very high stability. The aparatus is designed to determine the Creep of Mould Concrete Cylinder subjected to sustained longitudinal compressive load.

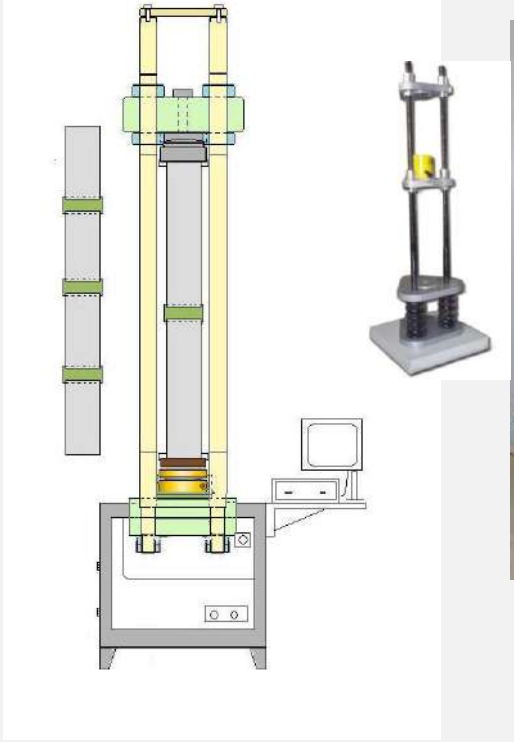
LOADING FRAME

The construction of these reaction frames is adapted according to the customer needing in vertical and horizontal space, stiffness and capacity.
The height of the testing space can be adjustable or fix.

In the case of fixed height (1), the adjustment is made by means of spacer discs to adapt the samples to the available space.

In the case of variable height (2) the adjustment is made by displacing the upper crosshead along the columns and locking the position by using a set of lock nuts. A set of internal bearings and a spirit level mounted in the crosshead are used to facilitate the suitable operation of changing the height and maintain a suitable horizontality of the crosshead. Another spirit level is mounted on the base plate of the frame. A set of tie bars are placed at the top of the columns to maintain the parallelism of the columns during the tests.

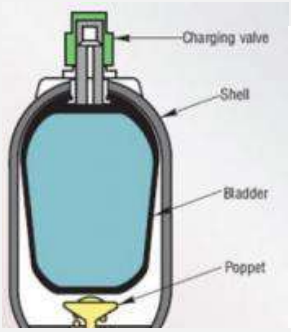
(2)



The 2, 3 or 4 columns frame is supported on a steel lower chassis containing the hydro-pneumatic loading system. The hydraulic actuator is placed on the lower base plate of the frame.
The dimensions of this chassis can be modified under demand to change the height of the test zone, for example. The supporting legs of this chassis have isolation pads and can be regulated in height to level the machine. The digital measuring and acquisition unit is placed on an attached table at suitable height. The chassis contains also the hydraulic quick couplings to pressurize from the hydraulic pump unit, the connection to recharge the hydro-pneumatic element (compressed Nitrogen) and electrical and manual regulation to charge/discharge the load.

INTEGRATED LOAD MAINTAINING SYSTEM: pressure N_2 accumulator system

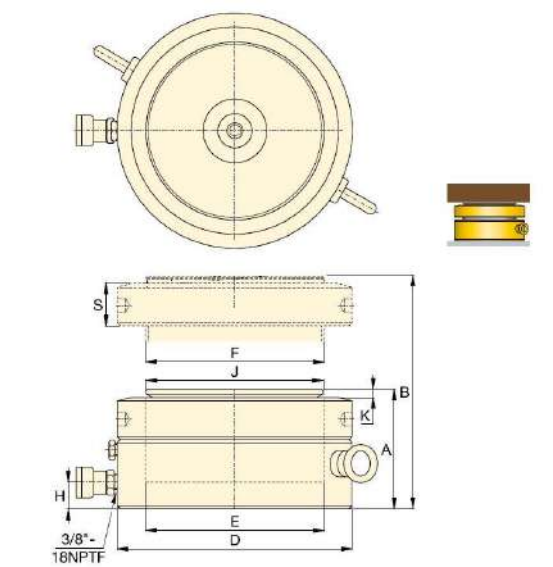
In order to maintain accurately and constant the applied force during long periods of time, the hydraulic system includes a hydro-pneumatic system composed by a pressure regulation **manifold** with a pressure switch and a proportional valve to supply the hydraulic pressure to the cylinder. This hydraulic pressure corresponds with the load to be applied and maintained. In rigid systems like this testing rig, a little change in longitudinal dimension (dilatation, elastic deformation, creep) could cause a relative big variation of the load. The integrated **hydro-pneumatic system** helps to maintain the load by means of the pressure N2 accumulator which provides enough pressurized oil to absorb any volumetric change while maintaining the applied load.
The **bladder accumulator**, 2.5 l; 345bar max., is supplied with nitrogen, ready to be used and a **6m length** hose quick-connecting coupling for filling the pressure accumulator



This bladder accumulator needs to be recharged if the N_2 pressure decreases below a defined value.
The CE type accumulators are delivered with some **installation and commissioning instructions** as well as **certificates of conformity.**

The hydro-pneumatic system is integrated in the lower chassis of the machine. A **safety block** is included in the compact block with the variety of functions necessary for the correct operation of a hydraulic system fitted with accumulators. This includes manual drain, isolation, flow control and pressure relief. Maximum working pressure: 330-500 bars.

HYDRAULIC ACTUATOR



The hydraulic actuator is placed on the lower base plate of the frame.
The actuator is put under pressure by a hand or motor driven pump and the force is kept constant by means of the hydro-pneumatic system.

The **actuator,** in this case, is **single ended single acting**, according with the requirements.
The hydraulic system allows a quick recovery of the starting position for new test.
It is a heavy duty cylinder **HA11-MT Flat Cylinder**

- Compact hydraulic cylinder wtih a flat design.
- Single-acting
- Automatic retraction takes place after releasing the load by direct connection to tank.
- Mounting holes permit easy fixturing; compression plate.
- Baked enamel finish for increased corrosion resistance
- Quick coupler and dust cap included
- Hard chrome plated high quality steel plungers
- Grooved plunger ends require no saddle.

Depending on the load and required stroke MICROTEST can provide the more suitable hydraulic actuator for the application.

FORCE MEASUREMENT

The system includes load measurement by means of a precision pressure transducer or integrated load cell.

The standard set-up uses an electronic force measurement system with a 5 digits digital display MIG-1, MICROTEST and a high precision pressure transducer CP series.
The high precision CP pressure transducer is measuring the applied load by monitoring the pressure inside the cylinder.

CP MICROTEST pressure transducers:
- Linearity better than 0.05%
- Repeatability better than 0.05%

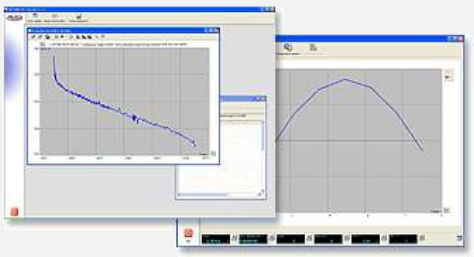
HYDRAULIC PUMPING UNITS

To produce the desired pressure corresponding to the testing force.
Different options depending on the application:

-Electrical pumping unit to load up to full capacity of the creep testing frame with oil tank and loading and unloading valves
- Flow rate: 1,5 l/min
- Working pressure: 250 bar (other values depending on the application)
- Electric power. 0,75kW
- Reservoir: 20 liters
- Pressure regulation
- Pressure limiter valve (security)
- Manual venting
- Movable unit by wheels, to displace the unit.

-Manual pumping unit: hand pump, with oil tank, hose and relief valve, depending on the application is also possible.

OPTIONS



SEF 4000 System: for data acquisition and analysis.
The unit is capable of storing data of **at least 25 test samples**.(up to 32)
The system includes the recording unit (with control panel touch screen) with storage capacity for more than 25 test samples. Hard disk included of at least 80GB.
The unit includes SEF4000 MICROTEST software to display graphics of the current (real time) or previous test (user selectable and configurable)

MT-EXT-HOR : for electronic deformation measurement
Longitudinal deformation: 3 LVDT or digital probes
Radial deformation: optional
Different ranges: from 0.5mm to 10mm
Base length: fixed or variable
Compatible with MIG-1 units.

Other sensors: strain gages, telescopic extensometers, temperature, etc.
Under request

Technical Specifications (typical values)

MODEL		F-ECH/400	F-ECH/1200 F-ECH/1500	F-ECH/2000
FORCE CAPACITY (**)	kN	400kN	1200kN, 1500kN	2000kN
STROKE (typical) (**)	mm	45mm	45mm	100mm
Frame (typical)		2-4 columns	4 columns	4 columns
Horizontal Clearance (F) (**)	mm	330-250	250-350	450
Max. Vertical Space (**) (h)	mm	1350	1350-1450	450
Plate diameter (typical (**)	mm	220	220	350
Force Measuring System (Typ.)		pressure transducer CP 400	Pressure Transducer CP 400 or extensometric Force Transducer	Pressure Transducer CP 400 or extensometric Force Transducer
Accuracy Class ISO 7500 or EN 12390-4		0.5 – 1	1 or better	1 or better
Resolution (Force)	kN	0.01	0.1	0.1
Weight (aprox.)	kg	700	1100	2400
Dimensions HxWxD (*)	H(mm)	2300	2600-2700	3100
	W(mm)	800	850	1150
	D(mm)	500	560	700

(*)Dimensions, weights and supply voltage can be adapted to the customer's needs.

(**) Other values are possible, under demand.

NOTE: Because MICROTEST has a policy of continuous product improvement, we reserve the right to change design and specifications at any time without prior notice.

MICROTEST, S.A.
C/ Valle de Tobalina, 10 28021 – MADRID (Spain) Tel.: (+34) 91 796 33 32
microtest@microtest-sa.com http://www.microtest-sa.com