

# Ball Harp

## Instruction Manual



### Shear strength

According to EN 1538 the Ball Harp is used to determine the shear strength of supporting fluids during the construction of diaphragm walls.



## EU Declaration of conformity

MUDTEST Sp. z o.o.  
Chętnońskiego 77, 32-500 Chrzanów, Poland

hereby declares that the following product:

Name of product	<b>Ball Harp</b>
Drawing number	9000.00.84500

complies with the provisions of the guidelines identified below, including those at the time of the declaration applicable changes.

**Machinery Directive 2006/42/EC**

The following harmonized standards were applied:

**EN 1538**  
**Execution of special geotechnical work - Diaphragm walls**

The following national standards were applied:

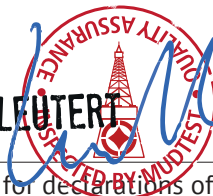
**DIN 4127**  
**Earthworks and foundation engineering – Test methods for supporting fluids used in the construction of diaphragm walls and their constituent products**

Adendorf, 29.11.2023

Place and date

SEBASTIAN LEUTERT

Management representative for declarations of conformity



## Description

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The Ball Harp test is the recommended test method for supporting fluids used in construction of diaphragm walls according to EN 1538. The Ball Harp consists of several glass and steel balls, each with different diameters. These balls are immersed in the supporting fluid at the same time. With a given density of the supporting fluid, each of these balls is assigned a different yield point. Balls whose yield points are smaller than the yield point of the suspension float. Balls with a yield point greater than the supporting fluid are immersed in it.

The balls of the Ball Harp are numbered 1 to 10 in the order of their increasing yield point. The yield point of the supporting fluid is thus between the yield point of the largest numbered ball that is still floating and the yield point of the smallest numbered ball that is immersed in the fluid.

The yield points of the standard ball set are specified for densities between 1.02 and 1.32 g/cm<sup>3</sup> (851.23 and 909.65 lb/gal). Heavy ball sets are available to determine the yield point of higher density suspensions.

The Ball Harp is not only used in diaphragm wall construction. The Ball Harp also helps to adjust the composition of drilling fluids that block invasion and prevent formation damage during drilling operations.

## Prepare measurement

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Check the equipment for completeness. Be sure to have a whisk to stir the suspension and a table fan.

1. Write the serial number of the ball set to be used onto the top of the disc.
2. Remove the O-ring from the disc.
3. Take the balls from the box and hang them into the notches within the disc.

**i** NOTICE: Maintain the order of the balls. The smallest glass ball is 1 the largest steel ball is 10.

4. Snap the O-ring back into the groove of the disc.
5. Hang the disc into the bracket of the ball harp stand

## Operation

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1. Fill the 1 liter beaker with the suspension.
2. Using a whisk, stir the suspension vigorously and thoroughly. In this way, the thixotropic hardening that has already developed is broken down.
3. Place the beaker on the base of the ball harp stand.
4. After 1 minute, lower the lever of the ball harp stand slowly and thus lower disc and balls. The balls hanging on the disc are immersed in the suspension or remain floating on it.

**i** NOTICE: If the test has to be representative, it is imperative that there is a 1 minute interval between stirring the suspension and immersing the balls in the surface of the supporting suspension. In addition, the temperature of the supporting liquid must not deviate from the target temperature by more than  $\pm 2$  °C during the test.

5. The threads of the balls immersed in the suspension are taut. The threads of the non-submerged balls are bent. The individual balls are numbered 1 to 10 on the disc. Please note the smallest number of balls immersed (tightened thread).



6. Slowly return the lever to its original position and clean the balls in a container filled with water by rotating them back and forth around the guide axis.
7. Hang the cleaned ball set in the supplied drying stand (see image on the left) and let it dry in the cold fan air flow.
8. The ball set can be used again once the balls are dry.

## Evaluation

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To determine the yield point please refer to the supplied calibration table. The yield point of the supporting liquid is between the critical yield point of the ball that is still floating and the ball that is immersed in the supporting liquid.

- i** NOTICE: Please note the serial number of the ball set. The table is only valid for this set of balls.

## Maintenance

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The ball harp requires little maintenance. Please ensure that the measuring instrument is stored properly and kept clean.

## Technical specifications

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Dimensions (L x W x H)

- Ball harp : 350 x 160 x 470 mm | 13,78 x 6,3 x 18,05"
- Transport case : 594 x 473 x 215 mm | 23,39 x 18,62 x 8,46"

Weight

- Boxed Ball Harp. : 9,5 kg | 20,9 lbs

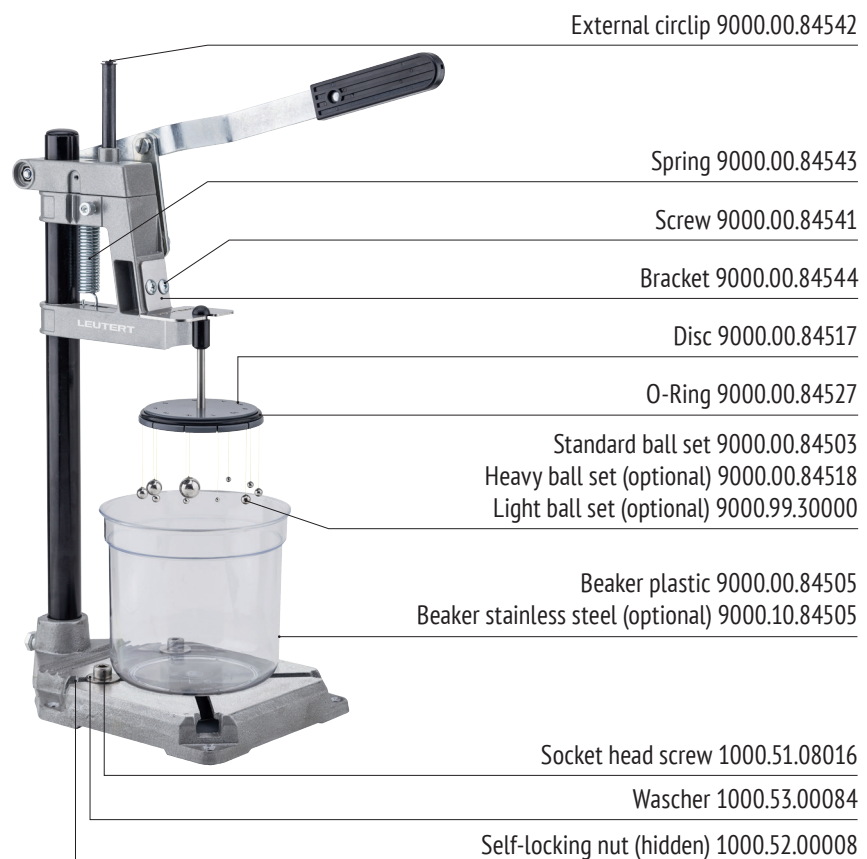
## Ball Harp / 9000.00.84500



Heavy duty case 9000.98.01000

Ball Harp Stand 9000.00.10000

Drying stand 9000.00.84554



External circlip 9000.00.84542

Spring 9000.00.84543

Screw 9000.00.84541

Bracket 9000.00.84544

Disc 9000.00.84517

O-Ring 9000.00.84527

Standard ball set 9000.00.84503  
Heavy ball set (optional) 9000.00.84518  
Light ball set (optional) 9000.99.30000

Beaker plastic 9000.00.84505  
Beaker stainless steel (optional) 9000.10.84505

Socket head screw 1000.51.08016

Wascher 1000.53.00084

Self-locking nut (hidden) 1000.52.00008