



# 浮筒切力计

## Shearometer Kit

型号: 1120



使用说明  
Instruction Manual  
更新 01/06/2020  
版本. 2.0  
Version 1.0

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请你仔细阅读《使用手册》，正确掌握本产品的安装和使用方法。阅读后请将本《使用手册》妥善保管，以备今后进行检修和维护时使用。

Please read the Instruction Manual carefully, for correctly grasping the installation and using method of this product. Please keep properly this Instruction Manual after reading, for the usage during troubleshooting and maintenance in the future.

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## 一、概述

经验表明：在静态条件下，当钻井液在井孔中没有循环，钻井液的静切力易于变得过大，这种变化在环境温度提高后显得更加明显。过大的静切力导致高泵压（破坏循环），进而导致钻井液漏失，促使测井、钻井等操作困难。因此，测量钻井液的静切力在钻井过程中显得非常重要。

浮筒切力计用来测量钻井液的静切力：测量钻井液在静止时粘土颗粒之间，相互吸引粘结而成的网架结构的强度大小（静切力）即破坏钻井液中单位面积上网架结构所需的力（切力）。通过浮筒切力计的标尺刻度可直接读取钻井液的静切力，单位为磅/100 平方英尺 (Pa)。测量所得的初切力和终切力对钻进和护孔都有着很大的意义。

青岛创梦仪器有限公司生产的浮筒切力计包括两个浮筒，一个浆杯，一个标尺和一个尺杆。每个浮筒重量为 5g，尺寸为 3.5×1.4 英寸。标尺安装在浆杯底的中心位置。

## 二、型号及规格

型号	名称	配置	特点
1120	浮筒切力计 Shearometer Kit		

## 三、仪器的主要技术参数

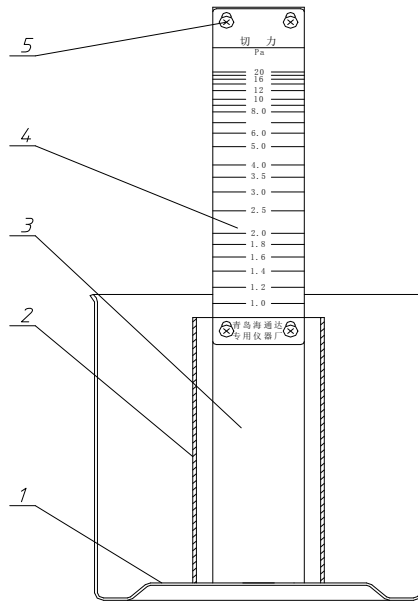
名称	技术参数
浮筒	内径 $\Phi 35.56\text{mm}$ (1.4 吋)，重量 5g
标尺	刻度 0~20Pa
钻井液杯	盛入钻井液液面应在标尺 0Pa (N/cm <sup>2</sup> ) 线上，容量约 500ml

## 四、仪器的结构与工作原理

(一) 结构：钻井液切力计由钻井液杯，标尺杆，标尺，浮筒等组成。

(二) 原理：将被测钻井液搅拌均匀，倒入钻井液杯，在浮筒自由下沉的作用下，测量一分钟内的初切力。再将搅拌均匀的钻井液倒入钻井液杯，让其静止 10 分钟，重新在浮筒作用下，观察其终切力。

序号	编号	名称
1	112001	钻井液杯
2	112002	浮筒
3	112003	尺杆
4	112004	标尺
5		圆头螺钉 M2×5



使用结构图

## 五、仪器的操作

### 1、用于测定钻井液的初、终切力

#### (1) 仪器

a. 浮筒切力计: 刻度值单位为 lb/100ft<sup>2</sup> 或 mg/cm<sup>2</sup>, 两种切力单位的换算关系是:

$$\text{mg/cm}^2 = (\text{lb}/100\text{ft}^2) \times 0.05;$$

b. 秒表。

#### (2) 测定步骤

a. 将刚刚经过充分搅拌的钻井液立即注入样品杯中并达到所标明的刻度线位置, 迅速将铝筒沿刻度尺垂直下移至与钻井液面接触, 然后轻轻放开铝筒并同时用秒表计时。铝筒自由下降浸入到钻井液中, 经过 1 分钟, 读取铝筒顶部边缘所对正的刻度值即为初切力。如果铝筒不能浸入到钻井液中, 表明钻井液太稠而无法测定, 如果铝筒在 60 秒内沉入到达样品杯底, 表明钻井液的初切力为零, 注明铝筒沉到底所需时间。

b. 取出铝筒, 洗净并擦干, 用搅拌棒搅拌样品杯中的钻井液, 静止 10 分钟, 再用上述方法测定, 所得读值为终切力。

### 2. 用于测定钻井液长时间或高温老化后的静切力

### (1) 仪器

- a. 不锈钢浮筒切力计;
- b. 用于放砝码的平板;
- c. 一套砝码(以克为单位);
- d. 钢板尺: 以英寸为单位, 精确到 0.1 英寸。

### (2) 测定步骤

- a. 小心取得高温静置老化后冷却至室温的钻井液样品, 将浮筒及平板小心地放置在钻井液样品表面上并使之平衡。如果高温老化后钻井液表面生成了一层表皮, 应先把表皮轻轻弄破。
- b. 在平板上小心地加上砝码以使浮筒开始向下移动, 最好所加砝码能使浮筒沉入钻井液超过浮筒一半的深度。
- c. 记录包括平板和砝码的总重量(W), 以克为单位。测量浮筒沉入钻井液的深度(L), 单位为英寸。

### (3) 计算

$$\text{静切力 } S(\text{lb}/100\text{ft}^2) = 3.61 \times (Z + W)/L - 0.256A$$

式中:

- S —— 静切力, lb/100ft<sup>2</sup>;  
Z —— 浮筒重量, g;  
W —— 平板和砝码的总重量, g;  
L —— 浮筒沉入的深度, in;  
A —— 钻井液的密度, lb/gal

## 六、仪器的维护与保养

- 1、清洗各部件并干燥待用, 仪器置于干燥环境中。
- 2、移动、维修或保养仪器时。要轻拿、轻放, 以免造成部件变形影响精度和使用。
- 3、确保标尺垂直液面。浮筒干净、完整、不变形。
- 4、浮筒与钻井液液面要轻轻接触, 让其自由沉落, 数据方能准确。

## 七、故障的判定与排除

故障: 将液体倒入钻井液杯中, 有渗漏现象。

原因: 尺杆底部与钻井液杯连接螺钉松动。

排除: 将钻井液杯底部螺钉卸掉, 取出尺杆, 将尺杆底部涂上密封胶, 重新按原样用螺钉固定, 将螺钉拧紧。

## 八、一年备件 (选购)

编号	名称	数量	备注
112002	浮筒	2	

# 1 Introduction

Experience has shown that many drilling fluids tend to develop excessive shear strength under static conditions when the mud is not circulating in the well bore. This is especially noticeable at elevated temperatures. Excessive shear strength results in high pump pressures required to “break circulation”, and causes difficulties in logging, perforating and other down-hole operations. Therefore, it is very important to determine the gel strength of drilling fluid during drilling operations.

The Shearometer Kit is a measuring device used to determine the gel strength of drilling fluid: It measures magnitude of strengthen of grid structure, i.e. gel strength when the surface of drilling fluid is calm, which is caused by attraction and bonding among many clay grains. It is the force that can break grid structure of drilling fluid per unit area.

Read and record the scale reading visible at the top of the Shearometer tube. The reading should be reported in pounds per 100 square feet (Pa) . Initial and terminal gel strengths measured make sense for drilling and protecting hole.

The Shearometer Kit produced by Qingdao Chuangmeng Instrument Co., Ltd. consists of two 5-gram, 3.5×1.4 inch, hollow shear tubes, and a sample cup that has a graduated scale mounted in the center of the cup base.

## 2 Model and specifications

Model	Description	Characteristics
1120	Shearometer Kit	Directly read the scale reading (gel strength) at the top of the Shearometer Kit tube.

## 3 Main technical parameters

Name	Technical parameters
Shear tube	35.56mm (1.4”) ID, 5-gram
Graduated scale	Measuring ranges 0~20Pa
Sample cup	The fluid level should be even with the “0”Pa (N/cm <sup>2</sup> ) line on the scale. The volume is approximately 500ml.

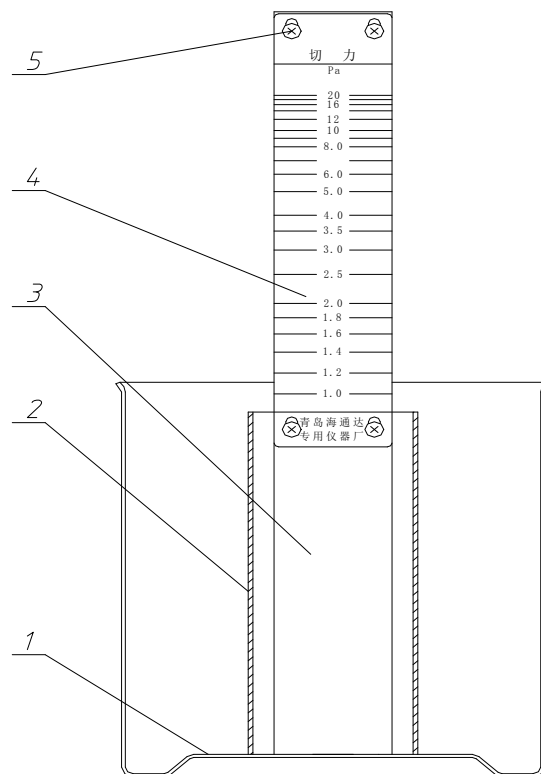
## 4 Structure and working principle:

- Structure

The Shearometer Kit consists of two shear tubes, a sample cup, a ruler rod, and a graduated

scale, etc.

No.	No	Part name	Qty
1	112001	Sample	1
2	112002	Shear tube	2
3	112003	Ruler rod	1
4	112004	Graduated scale	1
5		Round head screw M2×5	4



Parts of Shearometer Kit  
Structure of Shearometer Kit

- Working principle

Pour an agitated drilling fluid sample into the sample cup. Release the shear tube and let it sink into the fluid for one minute. After the one minute time period has elapsed, read and record the scale reading visible at the top of the shear tube as initial gel strength. Pour an agitated drilling fluid into the sample cup again. Allow the fluid to stand undisturbed for 10 minutes. Release the shear tube and let it sink into the fluid for one minute. After the one minute time period has elapsed, read and record the scale reading visible at the top of the shear tube as final gel strength.

## 5 Procedures- initial gel strength & final gel strength

The sample cup should be clean and dry before beginning the measurement procedure. Perform the steps in the following procedures to measure the initial gel strength and the final gel strength.\

- (1) Fit a shear tube over the graduated scale and lower the shear tube to the bottom of the sample cup. The upper edge of the shear tube should be even with the “zero” graduation line. If not, loosen the screw and adjust the graduated scale up or down, to make sure the ”zero” graduation line of the graduated scale is even with the upper edge of the shear tube.
- (2) Pour a freshly agitated drilling fluid into the sample cup. The drilling fluid level should be even with the “zero” graduation line of the measurement scale.
- (3) The moment the surface of the mud is calm, quickly fit a shear tube over the measurement scale and lower the tube to the surface of the drilling fluid. Release the shear tube and let it sink for one minute (measured from the instant the tube is released), keeping it vertical by guiding it with the fingers only if necessary.
- (4) After the minute has elapsed record the scale reading at the top of the shear tube. The reading should be reported in pounds per 100 square feet.

*Note: If the shear tube can not sink into the drilling fluid, it shows that the drilling fluid is too thick to measure. If the shear tube can sink into the drilling fluid, it shows that the gel strength of the drilling fluid is 0. Note the time the shear tube takes to sink into the bottom of the sample cup.*

- (5) Remove the shear cup, clean and dry it. Pour a freshly agitated drilling fluid into the sample cup. The drilling fluid level should be even with the “zero” graduation line of the measurement scale. Allow the drilling fluid to stand undisturbed for 10 minutes (or some other prescribed length of time). Repeat the above steps to read and record the scale reading at the top of the shear tube as the final gel strength.

## 6 Maintenance

- (1) Clean and dry all parts to be used. Place the instrument in dry conditions.
- (2) When moving, repairing and maintaining the instrument, handle with care to avoid deformation of parts and affecting accuracy and use.
- (3) Keep the graduated scale vertical to the drilling fluid level. The shear tube should be clean, perfect, and without deformation.
- (4) Carefully lower the tube to the surface of the drilling fluid, release the tube and let it sink into the fluid freely to make sure the scale reading is correct.



## 7 Troubleshooting

Problem or Symptom	Possible Cause	Corrective Action
When pouring the drilling fluid into the sample cup, the sample cup has the phenomenon of leakage.	Seal ring under the ruler rod is damaged.	Replace the seal ring.
	The screw connecting the ruler rod and sample cup has become loose.	Remove the screw and ruler rod, apply the sealant to the bottom of ruler rod, replace the ruler rod, and tighten the screw to fix the ruler rod.

## 8 Spare parts for one year (optional):

Model	Name	Quantity	Note
112102	Shear tube	2	

# 青岛创梦仪器有限公司 装箱单

## Qingdao Chuangmeng Instrument Co., Ltd. Packing list

生产企业：青岛创梦仪器有限公司

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Production address: No. 3 Xinghai Road, Liuting Street, Chengyang District, Qingdao

主机型号：1120

Model of the main motor: 1120

出厂编号：

Manufacturing No:

### 装箱单

序号	编号	名称及规格	单位	数量
1		主机	台	1
2		浮筒	只	2
3		十字花螺刀 (3*75mm)	只	1
4		使用手册	份	1
5		合格证	份	1