

# WGY-375 液动卡瓦使用说明书

Operating Instruction of Type WGY-375 Hydraulic slip

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## 一、产品简介 Introduction of the Product

本公司开发生产的 WGY375 液动卡瓦是一种石油、天然气钻井作业中卡持套管的液动操作工具。适用于 375 转盘使用，该液动卡瓦结构紧凑、安全可靠，解决了工人使用手动卡瓦时可能会发生的背部扭伤和疲劳，降低了工人的劳动强度，提高工效。该设备安装在转盘上，与转盘保持水平，方便套管钳工作。无需再另外搭建工作平台，实现了一个清洁安全的工作环境。下压的卡瓦可卡紧套管，省去了再使用手动卡瓦和背钳。

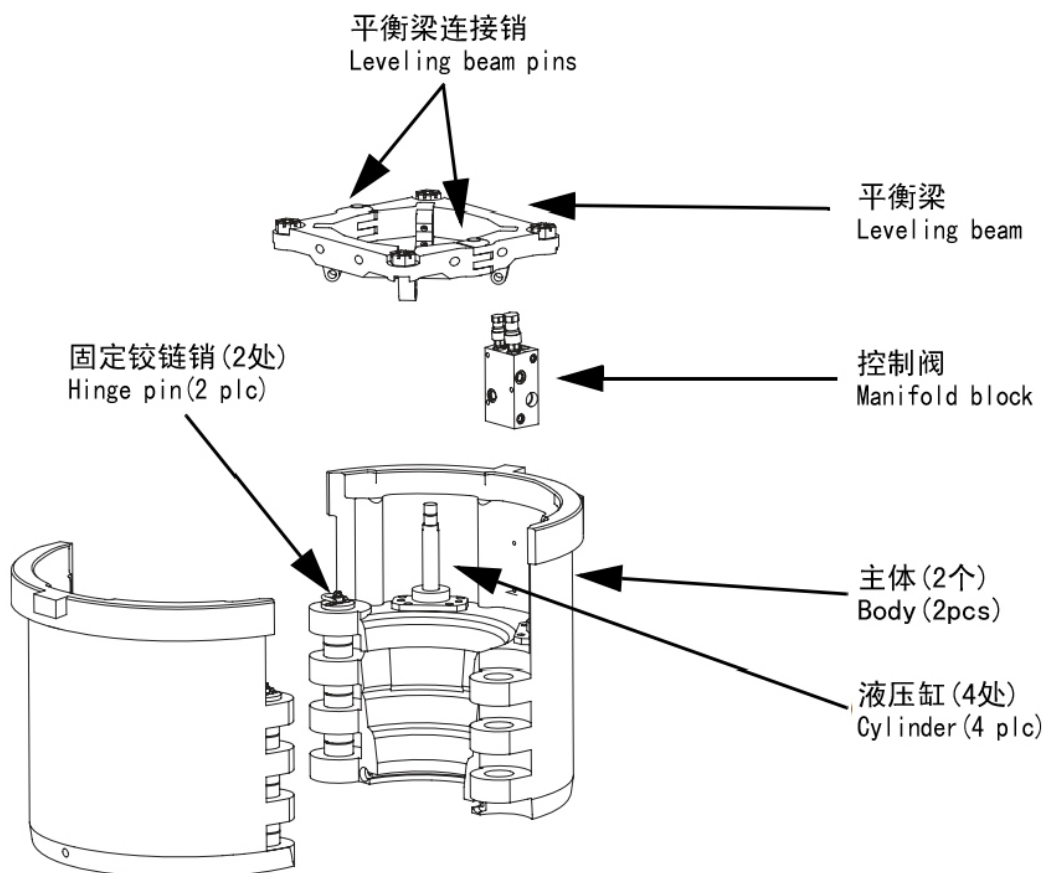
WGY375 hydraulic slip developed and produced by our company is a hydraulic operation tool for clamping casing during the drilling operation of petroleum and natural gas. Apply to the use of the 375 turntable, this hydraulic slip structure is compact, safe and reliable, which solves the back sprains and fatigue that many be occurred when workers use the manual slip, reduces labor intensity of workers and improves the work efficiency. If this equipment is installed on a turntable, it should keep horizontal to turntable and is convenient for the works of casing tong. It does not need to build another working platform to achieve a clean and safe working environment. The slip can clamp the casing tightly so as not to re-use manual slip and back-up tong.

## 二、主要技术参数 Main Technical Parameters

类别 Item	名称 Subject	介绍 Description
重量及外形 尺寸 Weight & Dimensions	不装卡瓦体 WGY375 重量 Weight WGY375 without slip assembly	5,392lbs/2,446kg
	装有牙板的卡瓦体重量 Weight WGY slips set with inserts	360-600lbs/163-272kg
	外形尺寸 Dimensions	φ 1120mm×1165mm φ 44"×45.9"
	适用管径 Pipe range	2.3/8"~14"
	载荷范围 RATING	最大 500 吨 Max. 500 STON
	转盘尺寸 Rotary size	37.5"
	2500psi(17.5Mpa)下所能提供的最大反扭矩 Max.. back up torque at 2,500psi (17.5MPa) hydraulic pressure	14"管柱时最大 40,000 ft.lbs (55000 N·m) 40,000 ft.lbs (55000N·m) max at 14" pipe size
液压系统 Hydraulic system	管线 Tubing and hoses	设备与液压站连接的管线直径最小 1/2"，推荐 3/4" All tubing and hoses connecting the WGY with the HPU must have a min. diameter of 1/2". Recommended is 3/4"
	回油管线 Tank line	回油管线必须直接连接到油箱以防背压 The tank line must be connected directly into tank to prevent back pressure

	工具类型 Type of tool	中位不回油 The WGY is a Closed Center Tool
配套控制柜 Control Box	进油口最大压力 Maximum inlet pressure	2,500 psi (17.5MPa)
过滤器 Filters	液压站回油过滤器 Filter to be applied before HUK in return line	10 μm
	液压站进油过滤器 Filter to be applied in hydraulic supply line	40 μm
温度 Design temperatures	环境温度 Ambient temperature range	-20°C~40°C
	工作油温 Working/operational/oil temp	推荐 40°-50°C Recommended 40°-50°C 最大 60°C Maximum 60°C
限定 Limits	操作限定 Use Limits	只能是经培训过的人员 Trained persons only (Users responsibility)
	空间限定 Space Limits	空间限定根据客户的实际使用情况确定 External limits defined by Defined in the Users Instructions

### 三、主要部件 Major components





平衡梁连接销  
Leveling beam pin

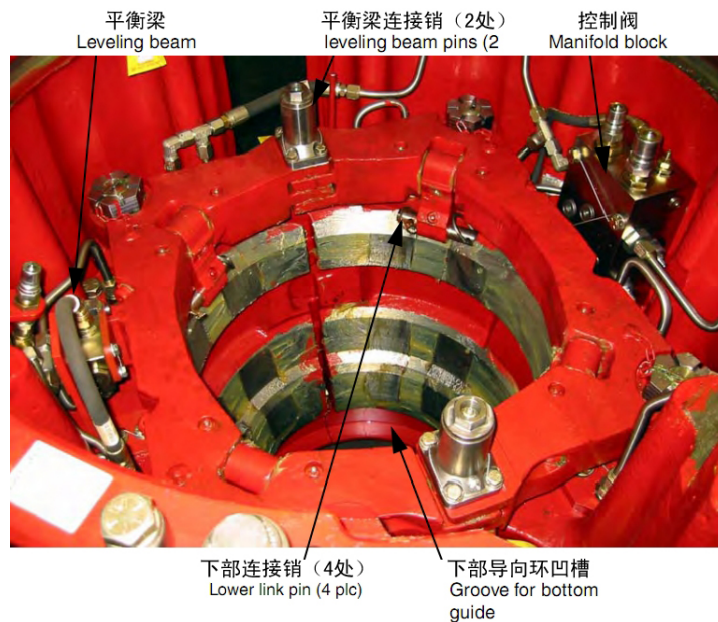
表 1 (Table 1)

卡持管径 Pipe size	卡瓦体型号 Model of the Slip Body	牙板 Insert	数量 Quantity	导向牙板 Guide Insert	数量 Quantity
			375		375
2 <sup>3</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>2</sub>		16		8
2 <sup>7</sup> / <sub>8</sub>			16		8
3 <sup>1</sup> / <sub>2</sub>			24		
4 <sup>1</sup> / <sub>2</sub>	5 <sup>1</sup> / <sub>2</sub>	2168	32	2168B	16
5		2169	32	2169B	16
5 <sup>1</sup> / <sub>2</sub>		2170	48		
6 <sup>5</sup> / <sub>8</sub>	7 <sup>5</sup> / <sub>8</sub>	2632	48	2632B	24
7		2623	48	2623B	24
7 <sup>5</sup> / <sub>8</sub>		2633	72		
7 <sup>3</sup> / <sub>4</sub>		2649	72		
8 <sup>5</sup> / <sub>8</sub>	9 <sup>5</sup> / <sub>8</sub>	2640	64	2640B	32
8 <sup>3</sup> / <sub>4</sub>		2650	64	2650B	32
9 <sup>5</sup> / <sub>8</sub>		2633	96		
9 <sup>3</sup> / <sub>4</sub>		2649	96		
9 <sup>7</sup> / <sub>8</sub>		2649	96		
10 <sup>3</sup> / <sub>4</sub>	11 <sup>3</sup> / <sub>4</sub>	2640	80	2640B	40
10 <sup>7</sup> / <sub>8</sub>		2650	80	2650B	40
11 <sup>3</sup> / <sub>4</sub>		2637	120		
11 <sup>1</sup> / <sub>8</sub>		2651	120		
13 <sup>3</sup> / <sub>8</sub>	14	2636	80	2636B	40
13 <sup>1</sup> / <sub>2</sub>		2652	80	2652B	40
13 <sup>5</sup> / <sub>8</sub>		2653	80	2653B	40
13 <sup>3</sup> / <sub>4</sub>		2655	80	2655B	40
14		2635	120		

表 2 (Table 2)

卡持管径 Pipe size	下部导向环 Bottom guide		上部导向板 Top guide	
	规格 Size	零件号 PN	规格 Size	零件号 PN
2 <sup>3</sup> / <sub>8</sub> ~2 <sup>7</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>8</sub> ~2 <sup>7</sup> / <sub>8</sub>	010710008		
3 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>2</sub>	010710009		
4~4 <sup>1</sup> / <sub>2</sub>	4~4 <sup>1</sup> / <sub>2</sub>	010807012	4~4 <sup>1</sup> / <sub>2</sub>	010807025
5	5	010807013	5	010807026
5 <sup>1</sup> / <sub>2</sub> ~5 <sup>3</sup> / <sub>4</sub>	5 <sup>1</sup> / <sub>2</sub> ~5 <sup>3</sup> / <sub>4</sub>	010807014	5 <sup>1</sup> / <sub>2</sub> ~5 <sup>3</sup> / <sub>4</sub>	010807027
6 <sup>5</sup> / <sub>8</sub> ~7	6 <sup>5</sup> / <sub>8</sub> ~7	010807015	6 <sup>5</sup> / <sub>8</sub> ~7	010807028
7 <sup>5</sup> / <sub>8</sub> ~7 <sup>3</sup> / <sub>4</sub>	7 <sup>5</sup> / <sub>8</sub> ~7 <sup>3</sup> / <sub>4</sub>	010807016	7 <sup>5</sup> / <sub>8</sub> ~7 <sup>3</sup> / <sub>4</sub>	010807029
8~8 <sup>1</sup> / <sub>8</sub>	8~8 <sup>1</sup> / <sub>8</sub>	010807127	8~8 <sup>1</sup> / <sub>8</sub>	010807128
8 <sup>5</sup> / <sub>8</sub> ~8 <sup>3</sup> / <sub>4</sub>	8 <sup>5</sup> / <sub>8</sub> ~8 <sup>3</sup> / <sub>4</sub>	010807017	8 <sup>5</sup> / <sub>8</sub> ~8 <sup>3</sup> / <sub>4</sub>	010807030
9 <sup>5</sup> / <sub>8</sub>	9 <sup>5</sup> / <sub>8</sub>	010807018	9 <sup>5</sup> / <sub>8</sub>	010807031
9 <sup>3</sup> / <sub>4</sub> ~9 <sup>7</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>4</sub> ~9 <sup>7</sup> / <sub>8</sub>	010807019	9 <sup>3</sup> / <sub>4</sub> ~9 <sup>7</sup> / <sub>8</sub>	010807032
10 <sup>3</sup> / <sub>4</sub> ~10 <sup>7</sup> / <sub>8</sub>	10 <sup>3</sup> / <sub>4</sub> ~10 <sup>7</sup> / <sub>8</sub>	010807020	10 <sup>3</sup> / <sub>4</sub> ~10 <sup>7</sup> / <sub>8</sub>	010807033
11 <sup>1</sup> / <sub>4</sub> ~11 <sup>7</sup> / <sub>8</sub>	11 <sup>1</sup> / <sub>4</sub> ~11 <sup>7</sup> / <sub>8</sub>	010807021	11 <sup>1</sup> / <sub>4</sub> ~11 <sup>7</sup> / <sub>8</sub>	010807034
12 <sup>3</sup> / <sub>4</sub>	12 <sup>3</sup> / <sub>4</sub>	010807129	12 <sup>3</sup> / <sub>4</sub>	010807130
13 <sup>3</sup> / <sub>8</sub>	13 <sup>3</sup> / <sub>8</sub>	010807022	13 <sup>3</sup> / <sub>8</sub>	010807035
13 <sup>1</sup> / <sub>2</sub> ~13 <sup>3</sup> / <sub>4</sub>	13 <sup>1</sup> / <sub>2</sub> ~13 <sup>3</sup> / <sub>4</sub>	010807023	13 <sup>1</sup> / <sub>2</sub> ~13 <sup>3</sup> / <sub>4</sub>	010807036
14	14	010807024	14	010807037

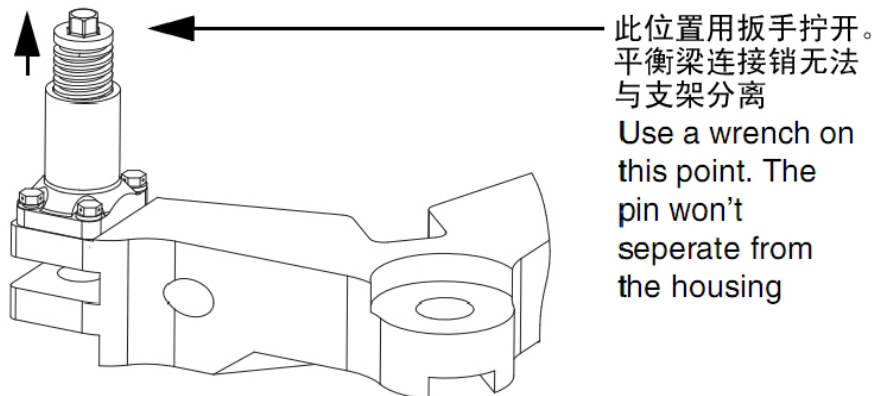
#### 四、安装 Installation



## 1、 分开主体 To split WGY

a、用扳手旋开两个平衡梁连接销，必须完全旋开螺纹。检验方法：用手提起连接销少许直到锁环的凸出部分可与连接销键槽的末端接触；

Disengage both leveling beam pins with a spanner / wrench, the pins must be disengaged completely. Check this by lifting the pin, it can be lifted a little until the cam of the spindle pin retainer reaches the end of the key-way;



**警告：**平衡梁连接销没有完全旋开螺纹前不能分开主体。否则会损坏平衡梁连接销和/或锁环。

**WARNING: Do not split the WGY without the leveling beam hinge pins completely disengaged. Not doing so will damage the pins and/or the retainer.**

b、起吊及分开两片主体时注意不要使锁紧销、止动销、铁链等将另一片主体上的零件缠绕或勾住；

Ensure lock pins, lynch pins and attachment chains do not foul with or get caught on the opposite body components when lifting and separating the two WGY body halves;

c、吊出一个可拆卸的铰链销；

Remove the one large removable WGY body hinge pin.





## 2、闭合主体 To close WGY

a、降落及闭合两片主体时注意不要使锁紧销、止动销、铁链等将另一片主体上的零件缠绕或勾住；

Make sure the pins, lynch pins and attachment chains do not foul with or get caught on the opposite body half components when lowering and recoupling the two WGY body halves;

b、安装可拆卸的铰链销；

Install large removable WGY body hinge pin;

c、旋紧平衡梁连接销并装好止动销；

Re-engage both leveling beam pins and lynch pins;

d、分开主体时：首先旋开平衡梁连接销，然后拆下铰链销；

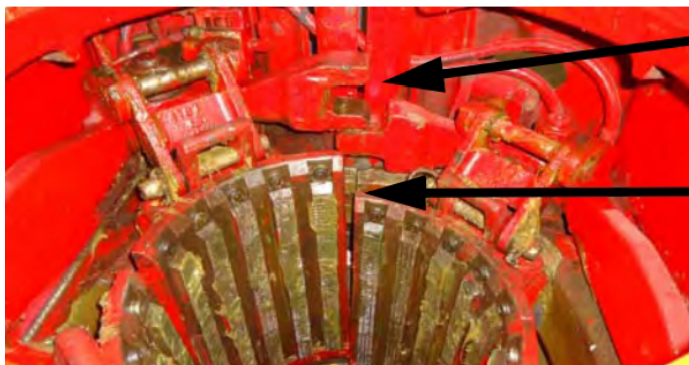
When splitting: first disconnect leveling beam pins, then remove hinge pin;

e、闭合主体时：首先安装铰链销，然后旋紧平衡梁连接销；

When joining: first assemble hinge pin, then connect leveling beam pins.

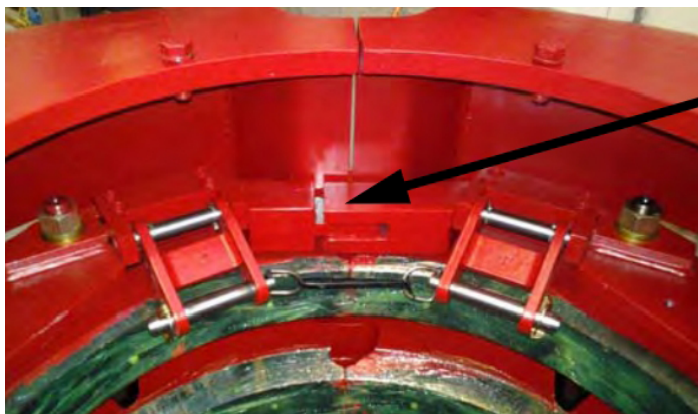
**警告：确保平衡梁榫头和榫眼啮合到位。闭合主体前可通过检查四个液压缸行程最大位置时活塞杆高度是否相等。**

**WARNING: Ensure the leveling beams “mesh and groove” are aligned and engage properly. This will be achieved by checking if the cylinders are stroked out equally before closing the body halves.**



错误：榫头和榫眼不啮合  
**WRONG:** Mesh and groove misaligned.

表现为卡瓦体高度不统一，  
将会导致夹不住管柱  
As a result the slip segments are not at the same height, which may result in a dropped pipe.



正确：榫头和榫眼啮合。  
**CORRECT:** Mesh and groove properly aligned.

### 3、卡瓦体的拆卸 **Removing slips**

- a、使卡瓦体处于上升位置；

Raise the slips (leveling beam) completely;

- b、确保动力站已关闭；

Make sure the hydraulic power unit is switched OFF;

- c、断开管线连接；

Disconnect the hoses;

- d、通过卡瓦体上面的起吊孔使卡瓦体克服自身重量稍微抬起；

With overhead hoist attached to slip lifting eye, pick up enough to take up the weight of the slip;

- e、待卡瓦体重量从下部连接销转移后拆下止动销，然后拔出下部连接销；

With slip weight off the lower link pin, remove the lower link pin by pulling out the lynch pin and then pulling the lower link pin out;

- f、将卡瓦体从主体内吊出；

Hoist slip from WGY;

- g、重复上述步骤拆下剩余的卡瓦体。

Repeat steps above for remaining slips.

### 4、卡瓦体的安装 **Installing slips**

- a、选择卡瓦体；

Select the slip;

- b、主体内锥和卡瓦背锥清理干净；

Remove dirt and grease from the WGY bowl and the back surface of the slips;

- c、检查卡瓦体和牙板规格是否正确；

Check that correct size of slips and inserts are used;

- d、用合适的油脂润滑主体内锥和卡瓦背锥；

Grease the back surface of the slips and the bowl with the appropriate grease;

- e、将卡瓦体吊起直适当位置并安装下部连接销；

Hoist the slip into place and install the lower link pin;

- f、安装止动销；

Install the lynch pin;

- g、重复上述步骤安装剩下的卡瓦。

Repeat above steps for remaining slips.

**警告：**本公司生产的每付卡瓦均由四页卡瓦体成付加工而成，并进行整体使用。不允许不同编号（编号位置在卡瓦上端面）的卡瓦体混合使用，否则可能造成卡持不住或咬死



等情况。由此产生的一切后果，本公司概不负责。

**Warning: Each pair of slips produced by our company are all made up of four pieces of slips, and could be used as a whole. The number of the slips must be consistent (the number is in the upper head face of the slip). Operation with slips of different number might cause unsteady buckling or sticking. Consequences due to the above wrong operation are not liable to our company.**

## 5、更换上部导向板 Changing top guide

- a、查表查出所要更换的上部导向板规格是否正确；  
Check that correct size of replacement guide is used. See table.
- b、拆下现已安装的上部导向板；  
Remove present guides;
- c、安装新的上部导向板并用螺栓固定；  
Install new guide halves and retain with bolts.

## 6、安装下部导向环 Installation bottom guide

**注意：起套管时必须安装有下部导向环。下套管时推荐安装下部导向环。**

**CAUTION: The bottom guide must be used when pulling casing. When POOH; bottom guide is required. When RIH, bottom guide is recommended.**

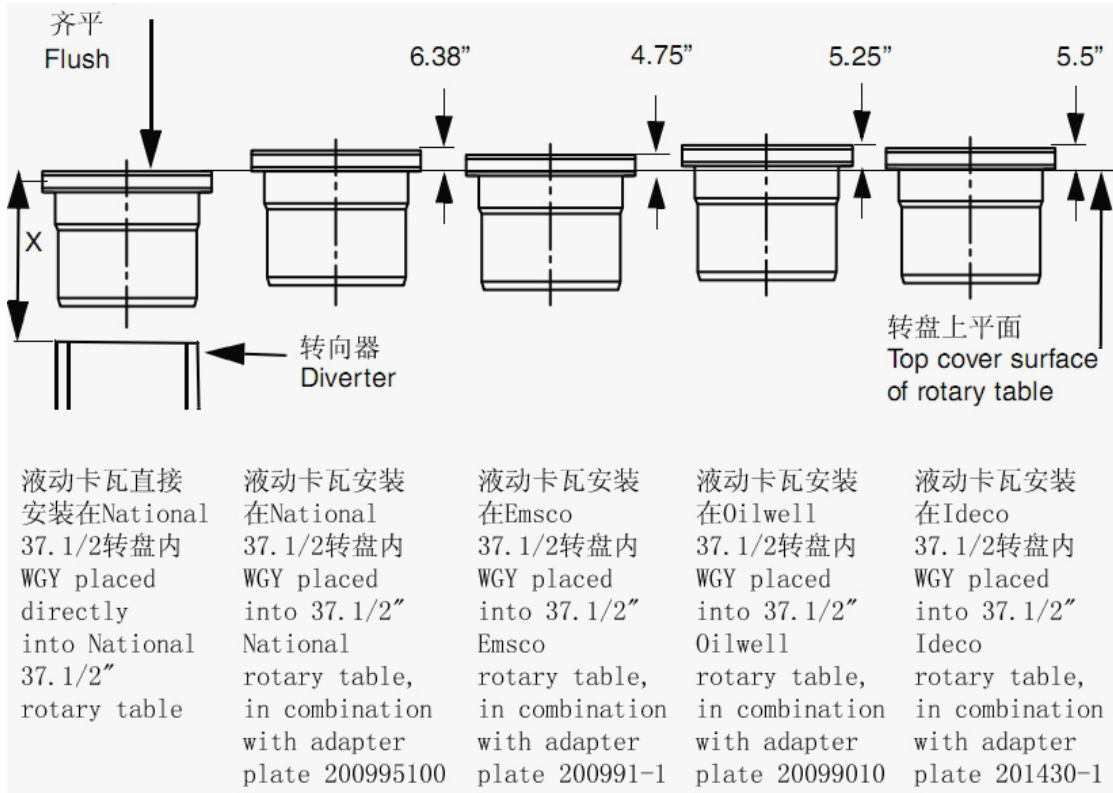
- a、查表确定下部导向环规格；  
Determine right bottom guide size. See tables.
- b、分开主体；  
Split WGY;
- c、安装下部导向环，使之滑入凹槽内；  
Install bottom guide halves in retaining groove in correct position;



- d、安装定位块和螺栓；  
Install retaining washers and bolts;
- e、闭合主体；  
Close WGY.

## 五、钻井平台上的安装 Installation in the rig-floor

过渡装置（选配）Adapter plates (optional)

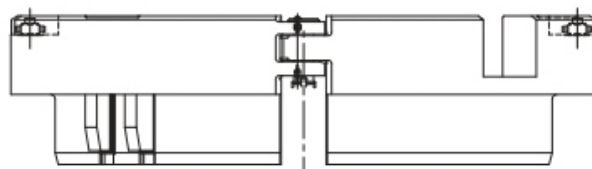


液动卡瓦安装在 National 37.1/2"转盘内与转盘上平面齐平，并从转盘上平面往下延伸35"；

The WGY is designed to fit flush to the top of a National 37.1/2" rotary table. The WGY extends 35" below the rig floor from the top of the rotary table.

注意：在钻井平台上安装液动卡瓦前请先检查距离 X。随意使用一个下部导向环检验距离 X。该距离应至少有 35"，否则将无法使用过渡装置。

NOTE: Always check dimension X (distance to diverter) on your rig prior to installation of the WGY. In case an optional bottom guide is used check dimension X accordingly. The dimensions must be at least 35" in order to prevent the use of adapter plates



National 37.1/2" 过渡装置200995100  
Adapter palte for National 37.1/2" Rotary Table p/n 200995100

## 六、操作方法 Operation

警告：液压站启动时液动卡瓦的卡瓦体有可能会运动。确认液动卡瓦附近没有人后再启

动液压站。

**WARNING: Be aware that the WGY can start moving its slips when the power unit runs.**

**Make sure that no person is near the WGY slips and then start the power unit.**

警告：没有断开管线前不要将手伸进液动卡瓦盖板内。严禁将手放置在管线和平衡梁之间以及管线和盖板之间。液压站与液动卡瓦连接并启动后，不要将手伸进液动卡瓦内。

**WARNING: Never put your hands inside the WGY cover plates without disconnecting the hoses first. Never place your hand between pipe and leveling beam and/or between pipe and cover plate. Do not put hands into the WGY when the hydraulic power unit is connected and running.**

### 1、操作前的检查 Pre-operation checks

上下套管作业前应先执行以下步骤。

The following procedures need to be carried out before the casing job is performed on the rig.

注意：下部导向环将引导管柱进入设备内，必须被正确安装。如没有安装下部导向环，将可能会对卡瓦体造成严重损伤。

**CAUTION: The bottom guide will guide the pipe into the tool and must be installed for proper functioning. If the bottom guide is not installed, serious damage to slips may occur.**

#### 1.1、检查卡瓦体总成、上和(或)下部导向环规格是否正确；

Check correct sizes of slips, top and/or bottom guide;

#### 1.2、检查上述部件是否安装正确；

Check correct installation of these parts;

#### 1.3、检查所有液压管路是否有磨损迹象；

Check all hydraulic hoses for signs of wear;

#### 1.4、将液动卡瓦与控制台、液压站正确连接好并检查：

Connect WGY and operation panel to a power unit and check:

a) 检查设备动作是否正确：操作手柄拨至“卡瓦上升”位置——卡瓦上升；操作手柄拨至“卡瓦下降”位置——卡瓦下降；

Check for the correct functioning of tool: pulling the operating handle to the “SLIPS UP” position——slips up; pulling the operating handle to the “SLIPS DOWN” position——slips down;

b) 检查液压管路是否漏油；

Check for any hydraulic leakage;

c) 检查卡瓦下降的油压；

Check hydraulic power down pressure;

d) 查表所需套管扭矩相对应的液压值;

See table for pressure versus casing torque;

e) 检查行程开关是否活动自如;

Check that lever of leveling beam indicator valve can move freely;

1.5、如有安装有过渡装置，检查过渡装置型号是否正确;

Check, if needed, that the correct adapter plate is with the WGY;

1.6、起吊设备时请使用设备上的4个旋转吊环；切勿通过盖板或平衡梁起吊设备；

Always use all 4 lifting eyes on WGY for any transportation. Never hoist WGY by cover plate or leveling beam;

1.7、设备起吊、运输前请先断开与设备连接的管线;

Disconnect hydraulic hoses from WGY prior to any transportation or splitting/joining of the WGY;

1.8、检查并清扫转盘;

Check and clean rotary table;

1.9、检查平衡梁销是否安装正确到位;

Check leveling beam pins are connecting the 2 leveling beam halves;

1.10、起吊过渡装置时请使用过渡装置上的2个旋转吊环。

Lift adapter plate with a 2 point lifting sling attached to the 2 lifting eyes only.

## 2、设备的安装与连接

### **Fitting the WGY in the Rotary Table & connection**

2.1、通过4个旋转吊环将设备安装于转盘中。如有必要在安装设备前请先在转盘内安装过渡装置;

Place WGY in rotary table using all 4 lifting eyes. If applicable, place adapter plate in rotary table prior to installation of WGY;

2.2、为防止设备安装时两片主体分开，请检查平衡梁连接销与平衡梁是否连接紧固可靠;

In case WGY was split at installation, check that leveling beam pins are connecting the 2 leveling beam halves;

2.3、检查铰链销是否已安装;

Check that hinge pin has been reinstalled;

2.4、与液压设备连接并检查设备的功能正确性。

Connect all hydraulic equipment and re-check correct functioning of the tool;

2.5、起套管作业时必须安装下部导向环;

If casing has to be pulled out of the hole, always install a bottom guide;

2.6、转盘和设备旋转前应先断开快换接头的连接;

When the rotary table and the WGY have to be rotated, always uncouple the quick disconnects from WGY prior to rotation;

2.7、如要分开主体，通常要先拆下铰链销和两个平衡梁连接销。

When the WGY needs to be split, always remove the hinge pin with swivel lifting ring and uncouple both leveling beam pins prior to splitting.

### 3、建议 Recommendations

3.1、建议设备由司钻操作；

It is recommended to have the WGY operated by the driller;

3.2、为使操作平稳，液动卡瓦卡瓦体下降时套管和吊卡应缓缓下降；

For smooth operation it is recommended to slightly lower the casing with the elevator while setting the WGY slips;

3.3、为使操作平稳，液动卡瓦卡瓦体上升时套管和吊卡也应缓缓上升；

For smooth operation it is recommended to slightly raise the casing with the elevator while releasing the WGY slips;

3.4、设备中无管柱时，设备上平面应用盖板遮住设备内孔；

Always close off the well bore at the top of the WGY by the top guide cover plate when there is no pipe in the WGY;

3.5、当使用半潜式钻井平台或浮下套管时，请使用设备上的转盘锁以防设备从转盘中脱离出来；

The rotary locks on the outside of the WGY may only be needed on semi submersible rigs or while floating in casing when there is a chance the WGY could come out of the rotary table;

3.6、设备上不要随意丢放任何物品；

Never place any equipment on top of the WGY;

3.7、开始操作前，应使卡瓦上下运动至少三次以排出液压管路中的空气。

Before starting operation remove air from the hydraulic circuit by cycling the slips fully up and down for at least 3 times.

### 4、操作方法 Operation

注意：系统中残留有空气可能会导致设备功能失常甚至夹不紧管柱。使卡瓦上下运动各三次以排出液压系统中的空气。

**CAUTION: Air in the circuit may lead to improper functioning of the WGY and may lead to dropping of pipe. Remove air from the hydraulic circuit by cycling the slips 3 times fully up and down.**

注意：在套管重量完全转移到吊卡上之前不要操作控制柜使卡瓦上升。

**CAUTION: Do not actuate valve on operation panel to raise slips until the casing string weight is fully transferred to the elevator.**

4.1、检查所要作业的管柱的挤毁压力、所需载荷和上/卸扣扭矩；

Check weight, make-up / break-out torque and crushing load of the pipe to be run;

4.2、查表确定工作液压；

Determine hydraulic working pressure according to table;

4.3、仔细阅读本手册上的注意和警告部分；

See caution and warning herein;

4.4、设备可安全卡持的管柱最大载荷等于能将管柱吊起的临界载荷减去设备施加的下压载荷；

The maximum pipe weight which can be safely handled with the WGY equals the critical hook load of pipe minus the applied power down force;

4.5、通过控制柜调节液压至合适数值；

Adjust hydraulic working pressure on operation panel;

4.6、每次作业都应检查内部液压接头。

Check internal hydraulic fittings once every job.

## 5、反扭矩 Back up torque

表 3 反扭矩 (Table 3 Back up torque)

工作液压 Hydraulic working pressure (psi)		载荷 Applied power down force		最大反扭矩(Ft-lbs) Maximum bearing torque (Ft-lbs)	
psi	kPa	STON(短吨)	TONNE(吨)	ft.lbs	N.m
2,500	17,236	47	42	40,000	54,232
2,200	15,168	41	37	35,200	47,724
2,000	13,789	38	34	32,000	43,386
1,800	12,410	34	30	28,800	39,047
1,600	11,031	30	27	25,600	34,708
1,400	9,652	26	24	22,400	30,370

注：此表仅适用于回路管线无压力的情况。

Note: This table is only applicable if there is no pressure in the return line.

## 七、润滑 Lubrication

### 安全 Safety

警告：液压卡瓦上不允许进行焊接操作。请联系经我公司认可的修理厂。

**WARNING: It is not allowed to weld on hydraulic slips or the control panel. Please contact an authorized RT repair facility.**

警告：对液动卡瓦执行任何动作前应确保所有液压管线都已断开连接。

**WARNING: Ensure that all hydraulic lines are disconnected before any work is performed on the hydraulic slips.**

警告：不要用油脂润滑牙板和牙板槽，否则会减小牙板槽和牙板间的摩擦系数从而使卡瓦体底部产生更高的载荷和应力。

**WARNING: No grease or pipe dope should be used for lubricating the inserts and insert slots as this will reduce the friction coefficient resulting in higher loads on the slip toe and thus higher stress.**

警告：液动卡瓦如已磨损或发现有裂纹，应进行换新或送至修理厂。

**WARNING: Hydraulic slips which have experienced wear or are found to have cracks must be replaced or repaired by a RT authorized repair facility.**

警告：请使用我公司的原厂配件。液动卡瓦由经热处理的铸造合金钢加工而成，不允许在油田上进行焊接操作。错误的焊接操作会产生裂纹和脆性。使用非正确焊接或修理的液动卡瓦非常危险。

**WARNING: Only original RT OEM parts must be used. Hydraulic slips are produced from cast alloy heat treated steel and must not be welded in the field. Improper welding can cause cracks and brittleness in heat-affected areas which can result in dramatic weakening of the part and possible failure. Using a WGY that has been improperly welded or repaired is dangerous.**

### 推荐使用的液压油 Recommended hydraulic fluid

不同工作温度所使用液压油的粘度等级：

The required viscosity class regarding the working temperature:

粘度等级 Viscosity class	工作温度 Working temperature
32	30-50 °C (86°F-122°F)
46	40-60 °C (104°F-140°F)
68	50-70 °C (122°-158°F)



## 推荐使用的油脂 Recommended grease

油脂类型: ISO-L-XCCHB2

Grease type: ISO-L-XCCHB2

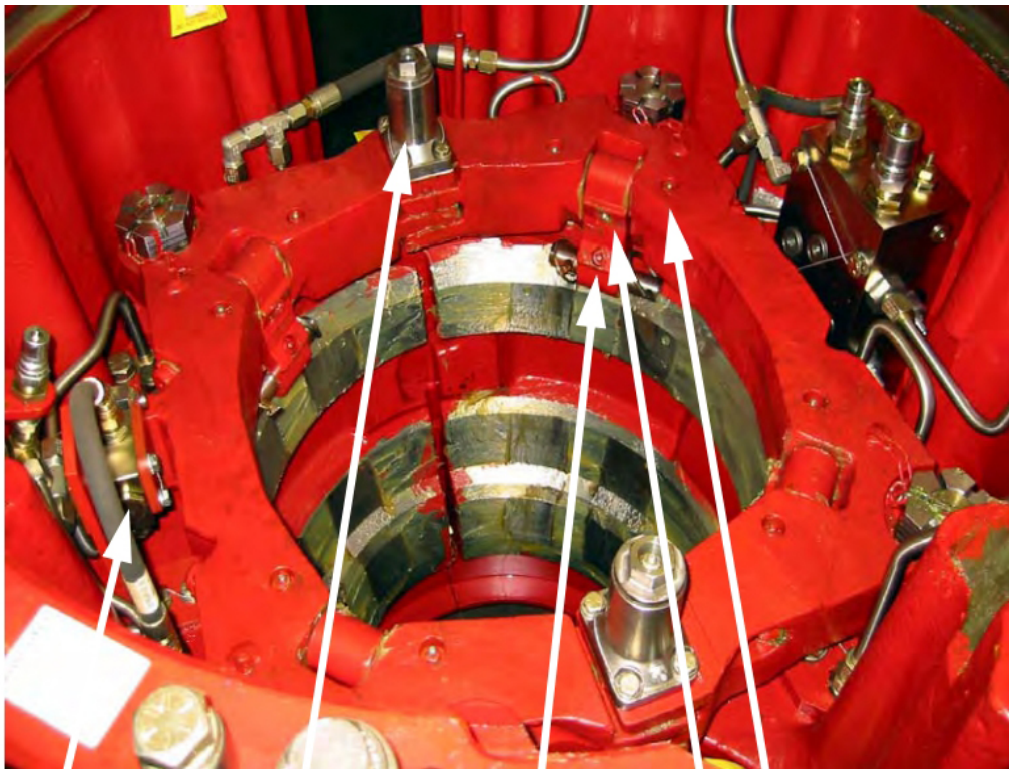
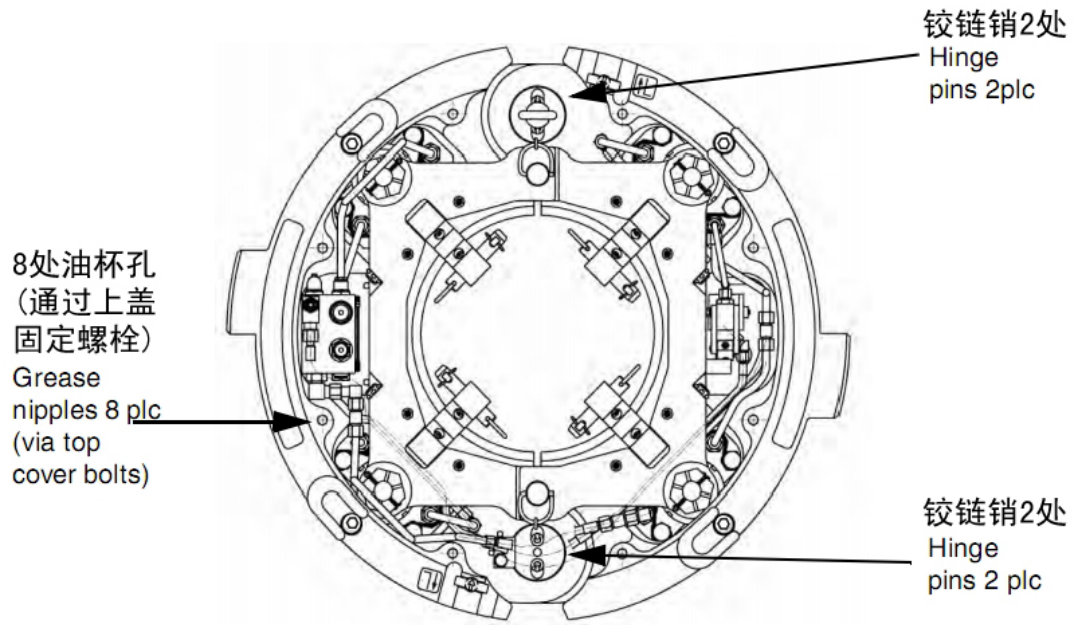
编号 No.	项目 Items	使用的润滑油 The Use of Lubricating Oil	润滑周期 Lubrication Cycle
1	主体内锥/卡瓦背锥 Internal Cone of the Main Body/Contact Surface of the Slip	多用途抗水极压油脂 Multi-purpose water resistant extreme pressure grease EP1 or EP2	见下面 See the Following

## 润滑部位 Greasing points

每下 75 根套管和/或灌浆前、卡持套管 1 小时以上和存储前都应进行以下润滑。

After every run of 75 joints and/or prior to cementing When load is hanging for more than 1 hour Prior to storage

润滑部位 Grease point	润滑方法 How to apply	数量 Number
导向环凹槽 Dove tail insert carrier	毛刷 Brush	4
主体铰链销 Body hinge pin	油杯 Grease nipple	4
上部连接销 Upper link pin	油杯 Grease nipple	4
下部连接销 Lower link pin	油杯 Grease nipple	4
行程开关 Leveling beam indicator	油杯 Grease nipple	1
平衡梁连接销 Leveling beam pin	油杯 Grease nipple	4
卡瓦背锥 Back of slips	通过上盖板固定螺栓上的油杯 Grease nipple via top cover bolts	8



行程开关  
Leveling beam  
indicator

平衡梁连接销  
Leveling  
beam pin

下部连接销  
Lower  
leveling  
beam  
link pins

上部连接销  
Upper  
leveling  
beam  
link pins

平衡梁支架8处  
Leveling  
beam  
brackets  
8 plc

## 八、检测 Inspection

### 1、每日检测(设备在使用中)

#### **Daily Inspection (when tool is in use)**

#### 1.1、 观察设备，有必要时进行修理

Observe and repair when needed

##### a、卡瓦上升/下降操作 5 次。卡瓦体每个运动周期动作应做到位；

Set and raise the slips 5 times. Slips should set and raise completely at each cycle, check for a flawless movement of the slips;

##### b、观察设备操作时是否有异常表现。

Observe equipment during operations for indications of inadequate performance.

#### 1.2、 目视检测，有必要时进行修理

Visually inspect and repair when needed

##### a、检查是否有磨损和损坏的零件；

Check for worn and damaged parts;

##### b、检查是否有松脱和装错的零件；

Check for loose and missing parts;

##### c、检查卡瓦、牙板、上部导向板规格是否正确；

Check correct sizes of slips, insert carriers and top guide;

##### d、检查各零件是否安装正确；

Check correct installation of these parts;

##### e、检查接头、管线、阀、液压缸等是否漏油；

Check for leakage free fittings, tubes, hoses, valves & cylinder;

##### f、检查旋转吊环是否锈蚀、磨损，吊环是否变形和拉长；

Inspect hoist swivel ring parts for corrosion, wear damage and if the bail is bent or elongated;

##### g、检查螺栓和螺母是否紧固到位；

Check proper locking of all slips lock bolts and nuts;

##### h、检查所有卡瓦体位置是否正确；

Check that all slips are well seated and retained;

##### i、检查所有下部连接销是否已安装止动销；

Check that all slips are locked;

##### j、检查管线是否有裂纹或磨损迹象；

Check hoses for signs of cracks, wear or abrasion;

##### k、检查螺栓螺母、安全铁链、带槽螺母和开口销、止动销、锁环、锁紧铁丝等是否安

装正确；

Check the proper locking of bolts and nuts, safety chains/wires, slotted nuts & cotter pins, lock tabs & lock bars, roll pins and dowel pins, snap rings, cotter pins, locking rings and lock wire;

1、检查下部导向环定位块是否磨损。定位块与下部导向环的重叠部分应至少有 3mm。

Check the bottom guides guide keepers for wear, the guide keeper should have an overlap of a minimum of 1/8”.

## 2 半年检测 6 Monthly Inspection

拆下两个主体固定铰链销，根据本章的最大磨损极限检查铰链销和销孔尺寸。

Disassemble the following parts of the tong for dimensional check according to max. allowable wear (see this chapter):

- Stationary hinge pin
- Removable hinge pin
- Stationary hinge pin hole
- Removable hinge pin hole

## 3 一年检测 Annual (1 year) Inspection (when tool is in use)

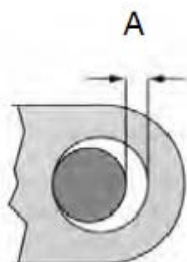
对承载部件进行磁粉检测，承载部件为 WGY375 主体、卡瓦体和铰链销。

MPI WGY load bearing components critical areas as per MPI-procedure. Major load bearing components are:

- Body WGY375
- Slips
- Hinge pins (considered 100% critical)

## 4 铰链销磨损的检测 Inspection for wear of hinge pin

铰链销磨损项目 Hinge pin wear data	WGY375
固定铰链销 Stationary hinge pin	
可拆卸铰链销 Removable hinge pin	
总间隙“A” Total clearance "A"	0.050" (1.27 mm)
铰链销最小直径 Hinge pin min. dia new	3.490" (88.646 mm)
新孔最大直径 Max. bore dia new	3.505" (89.027 mm)
孔磨损后最大直径 Bore wear worn max.	3.530" (89.662 mm)



## 5、平衡梁连接销检测 **Inspection levelling beam spindle pin**

以下项目须被检验：The following items need to be checked:

- a、检查锁环是否磨损，锁环凸出部分不能损坏。
  - a. check spindle pin retainer for wear, the cam must not be damaged
- b、检测连接销末端是否磨损
  - b. check spindle pin end for wear



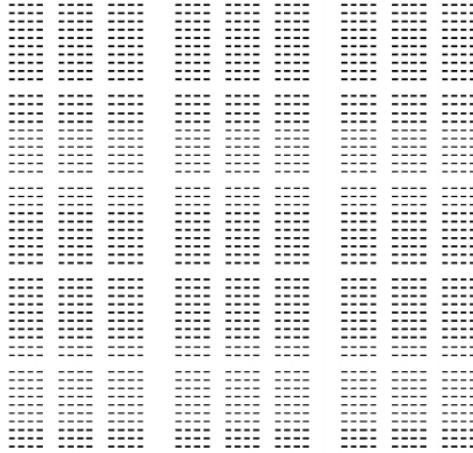
## 6、卡瓦检验（试纸检验） **Slip test (paper test) procedure**

试纸检验是检验卡瓦和内衬磨损程度最好的方法。

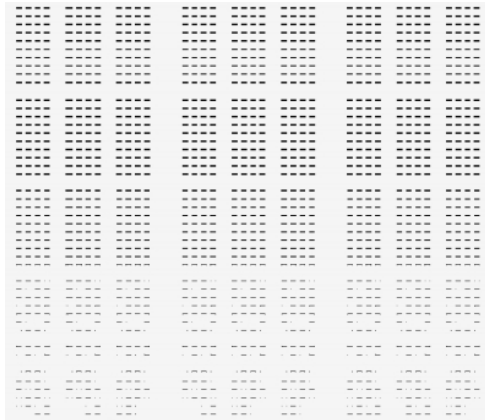
Paper test is the best way to determine the degree of rotary equipment wear of slips and bowl.

- a、将设备与液压站连接；  
Connect WGY to power unit;
- b、安装好卡瓦和牙板；  
Dress WGY with slips and clean inserts;
- c、用防水纸包裹管柱上被牙板咬合的区域；  
Wrap water proof paper around clean insert mark free section of pipe meeting the slip/insert size;
- d、用 2500PSI 的压力夹持管柱；  
Clamp slips on pipe using 2500 psi power down pressure;
- e、检查：Evaluation
  - 1) 若所有区域都有牙板接触，说明一切完好；  
Full insert contact indicates WGY and slips are good (no further analysis needed);
  - 2) 若只有上部分有牙板咬合的痕迹，说明设备、卡瓦或底部牙板有磨损，换新卡瓦体和牙板重新测试；  
Insert contact on top section only indicates: worn WGY or slips or damaged bottom inserts. Conduct test again with new slips.
  - 3) 如重新测试后仍然只有上部分牙板能够咬合管柱，请立即联系本公司进行维修。

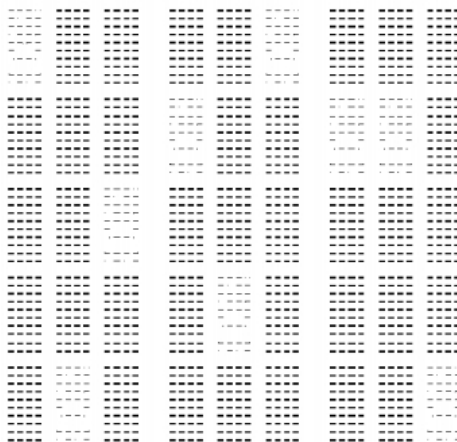
If new test shows insert contact on top section only, remove WGY from field operation and contact a repair facility.



100%完全接触，符合要求。100% contact. Acceptable



卡瓦背锥或主体内锥磨损，补心、吊卡孔径和/或铰链销磨损。不接受( 80%<接触面积<85%)  
Run out of bottom dovetails (all segments) or worn bowl, bushing, elevator bore and or hinges. Not acceptable ( 80%< contact< 85%)



大约 80%接触面积，多由于牙板磨损。不能接受。  
About 80 contact most likely due to inserts worn, damaged or not made within the tolerances. This is NOT acceptable.

## 九、故障排查 **Trouble shooting**

**警告：**对设备进行检查前应断开所有液压管线的连接。

**WARNING: Make sure that all hydraulic lines are disconnected before any work is carried out on the WGY**

对出现故障的设备进行故障排查前先进行下述检查：

a、检查所有软管及快换接头正确连接；

Check that all hoses and quick disconnects are properly connected.

b、检查设备阀体、控制柜、快换接头或管线是否漏油；

Check whether oil leakage is visible at manifold block, operation panel, Quick disconnects or hoses

c、检查设备的润滑状态。

Check lubrication status of tool.

大多数故障可以通过正确选择液压油以及正确地保养设备来防止。

Most of the troubles could have been prevented by proper selection of hydraulic oils and proper maintenance of both equipment and oil.

确定液压系统故障是专业维修人员的工作。他必须要熟悉设备的使用、构造和操作。他还必须充分了解液压回路和液压元件以确定故障。

Locating trouble in a hydraulic system is a job for a well trained maintenance man. He should be familiar with the equipment used, its construction and operation. He should know enough about hydraulic circuits and components to localize the troubles.

**最原始的检测往往能够解决大多数问题。**

**Initial checkes, solves most problems.**

a、设备有液压吗？

Is hydraulic pressure available?

b、检验向控制柜提供的液压至少为 2,000 psi/14MPa；

Measure pressure after the filter, fitted before the Control Panel. Check that the power supply is at least 2,000 psi/14MPa.

c、检验回油管线压力不超过 200 psi/1.5MPa；

Check the pressure in the return line. It should not exceed 200 psi/1.5MPa

d、检验所有管线直径都不小于 1/2”

Check all used hoses / tubing at least 1/2” minimum diameter

e、检查行程开关设置正确。

Check if the leveling beam detection valve is adjusted properly



### 1、设备功能有误 The WGY functions incorrect

原因 Problem	解决方法 Corrective action
上部导向板/下部导向环规格有误 Has the bottom guide/top guide the correct size?	更换正确的规格 Change the correct size.
控制阀堵塞 Is the manifold block dirty?	清洗阀 Flush if required
液压缸故障 Is there a problem with one of the cylinders?	检查是否漏油，功能是否正常？ Check for leakage, proper functioning.
液压缸与平衡梁连接的螺母是否松开 Are the nuts of the cylinders connecting the leveling beam loose?	旋紧螺母 Adjust if required.
设备没有充分润滑 Is the tool lubricated sufficiently?	按本说明书润滑章节润滑设备 Lubricate tool according to instruction in chapter Lubrication.

### 2、管柱打滑 The pipe is slipping through the inserts

原因 Problem	解决方法 Corrective action
牙板磨损 Are the teeth of the inserts worn?	检查并更换 Check and change if necessary
卡瓦体规格不对 Wrong size slips	更换卡瓦体 Change slips
卡瓦体装错牙板 The slips dressed with the wrong size inserts.	更换牙板 Change inserts
检查卡瓦磨损情况，卡瓦背锥磨损会使卡瓦座入主体的位置降低而可能碰到下部导向环，且阻碍牙板咬紧管柱。 Check for slip abrasion. The back cone abrasion of the slip could lower the slip's position in the main body, so the slip might bump against the lower guide ring, and hinder the slip segment cling tightly to the tubular column.	更换卡瓦体 Change slips
润滑不充分 Is the tool lubricated sufficiently?	按本说明书润滑章节润滑设备 Lubricate tool according to instruction in chapter Lubrication.

### 3、卡瓦体动作太慢 The slips are traveling up / down too slow

原因 Problem	解决方法 Corrective action
流量太低 Is the hydraulic flow supply to the WGY too low?	检查快换接头连接状况 Check condition of quick disconnects. 所有阀是否通畅 Are all valves fully opened?
向设备提供的压力太低 Is the hydraulic pressure supply to the WGY too low?	应向设备提供至少 2,000 psi/14MPa 液压 Check minimal differential pressure over P and Xp is minimal 2,000 psi/14MPa

## 十、运输和储存 Transportation and Storage

1、在运输过程中，严禁碰撞，避免雨淋；

In the transportation process, it should avoid strictly collision and the rain

2、气动卡瓦应存放在通风干燥处，不得日晒、雨淋。严禁接触酸、碱和盐类等腐蚀性物质。

Pneumatic slip should be stored in ventilated and dry place, with no sun and rain; Acid, alkali, salt and other corrosive substances are forbidden to contact.