



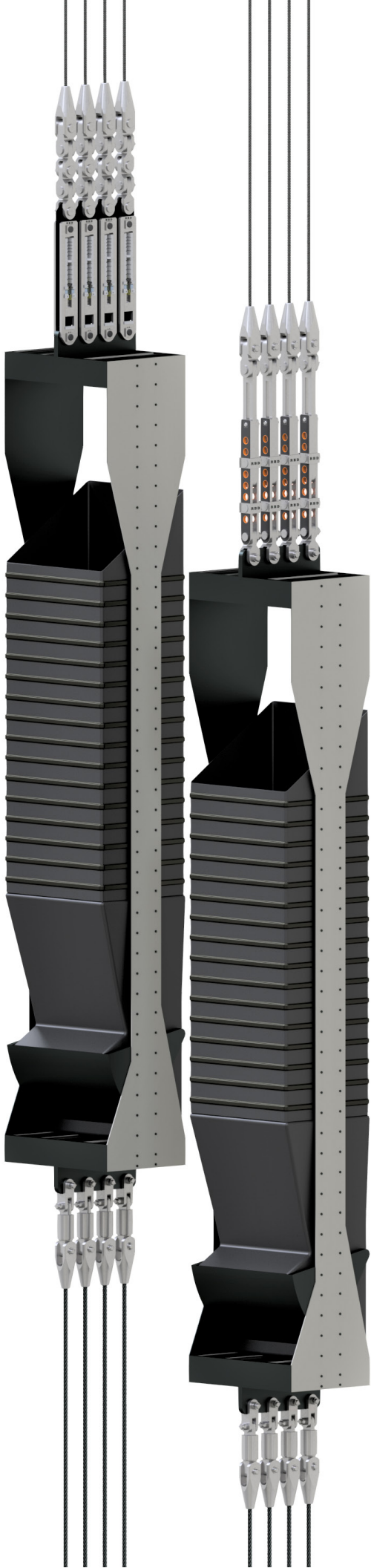
**[reliancebarkerdavies.com](http://reliancebarkerdavies.com)**

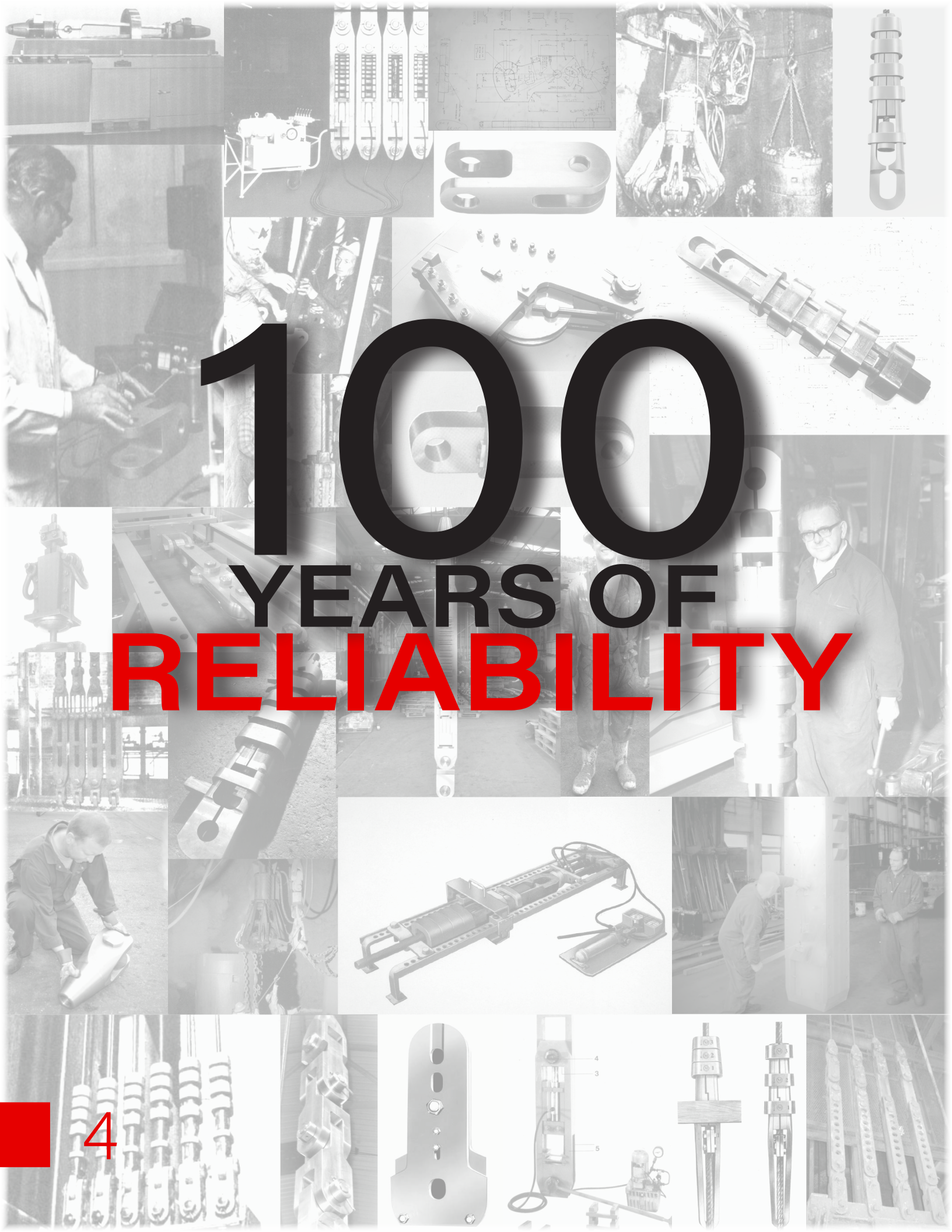




# CONTENTS

<b>WHO WE ARE</b>	<b>4</b>
History	
<b>HOIST ROPE ATTACHMENTS</b>	<b>6</b>
Typical koepe hoist arrangements	
Typical drum hoist arrangement	
Typical hoist rope terminations	
<b>BALANCE ROPE ATTACHMENTS</b>	<b>10</b>
Typical balance rope arrangements	
Typical balance rope terminations	
<b>GUIDE ROPE ATTACHMENTS</b>	<b>12</b>
Cheesweight tensioning systems	
Typical guide rope terminations	
CCM tensioning systems	
<b>GLANDS</b>	<b>16</b>
<b>SHAFT SINKING</b>	<b>18</b>
Galloway and workstage suspension	
Shaft sinking equipment	
<b>DETACHING HOOKS</b>	<b>20</b>
<b>CATCHGEAR</b>	<b>22</b>
Reliance-Worrall	
Barker-Davies	
<b>RECERTIFICATION</b>	<b>24</b>
<b>TECHNICAL SERVICES</b>	<b>26</b>





# 100

## YEARS OF

# RELIABILITY



4



# WHO WE ARE



## **There is no substitute for experience.**

The Reliance Rope Attachment Company Ltd was incorporated in Cardiff, Wales in January 1920. The company developed and patented the interlocking wedge type cappel. In this they were given considerable assistance by Latch & Batchelor Ltd of Hay Mills, Birmingham: the inventors and patentees of the locked coil and flattened strand ropes.

From the 1950's the Reliance name became known around the world following a series of export drives to supply suspension equipment to mines in France, Sweden, Finland, Portugal, Ghana, South Africa, Zambia, India, Australia, Canada, Mexico, Peru and the USA.

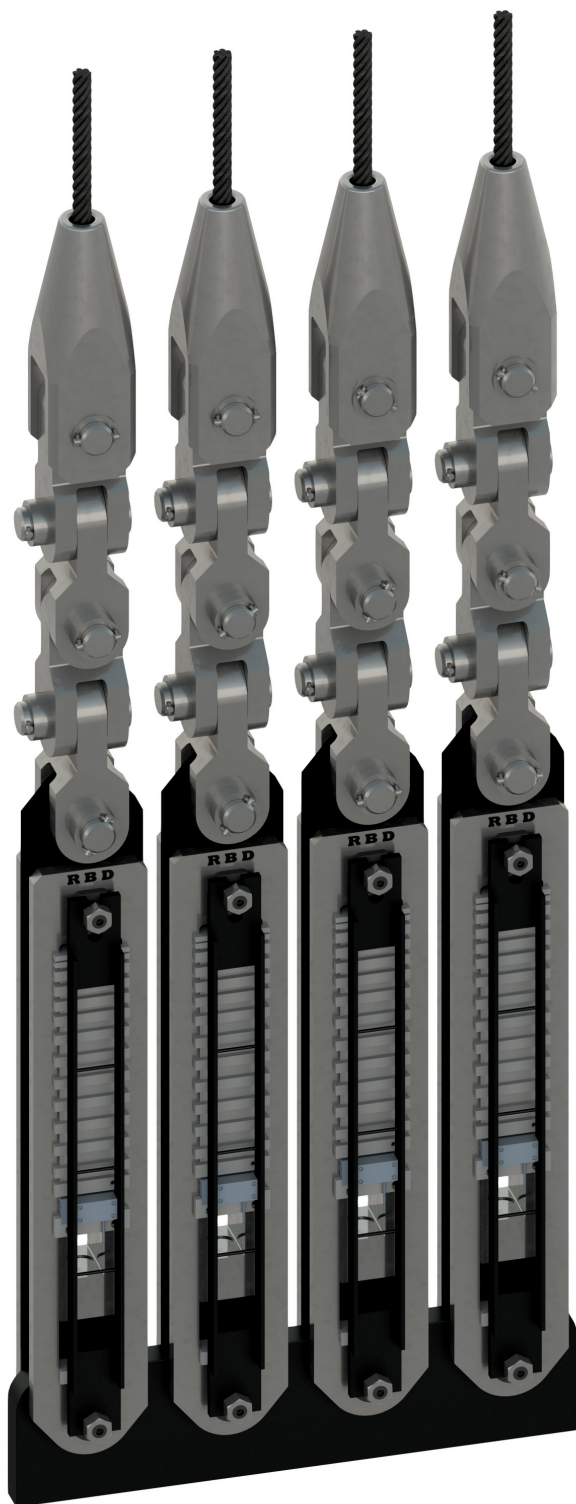
Originally wedge cappel components were cast and the cappel limbs forged into their U shape. Wedge Type Glands too were cast.

In 1987 Reliance Barker Davies Ltd was formed by the merger of the Reliance Rope Attachment Company Ltd with Barker-Davies Ltd, a well known attachment maker, and John R George Ltd engineers. From that point on, components were precision machined with CNC machines as they are manufactured today.

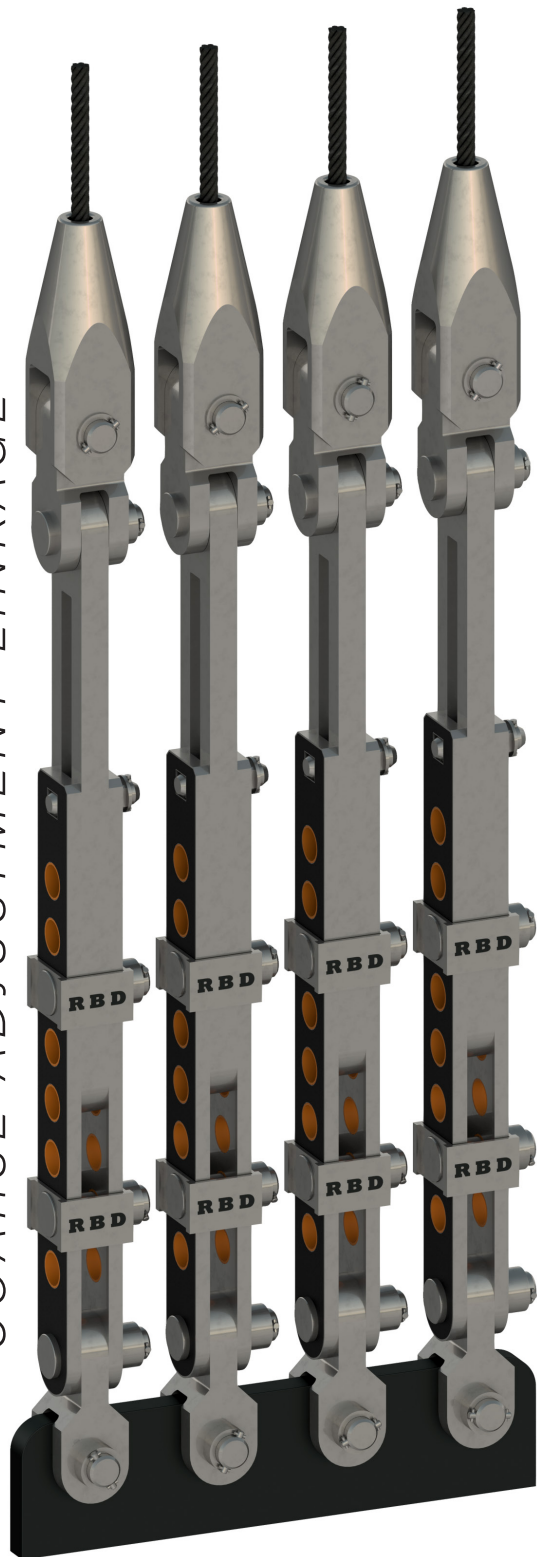
In 1990 Reliance Barker Davies Inc started an attachment Inspection and Re-certification Service in Sudbury, Ontario for the repair and overhaul of attachments. In 2015 all manufacturing was moved to Sudbury, Ontario.

# TYPICAL KOEPE HOIST ARRANGEMENTS

FINE ADJUSTMENT LINKAGE



COARSE ADJUSTMENT LINKAGE



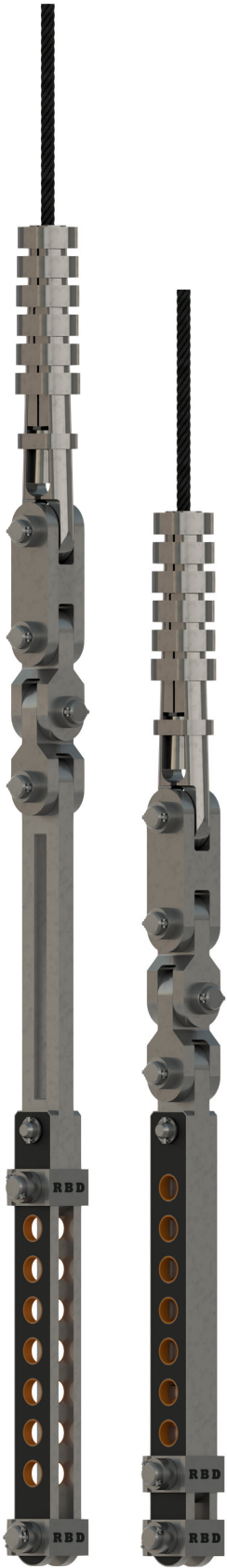
Coarse and fine adjustment linkages are intended for opposing conveyances in a typical koepe friction hoisting arrangement.

6

The purpose of these assemblies is to allow for a safe, reliable and practical method for equalizing hoist rope tensions.

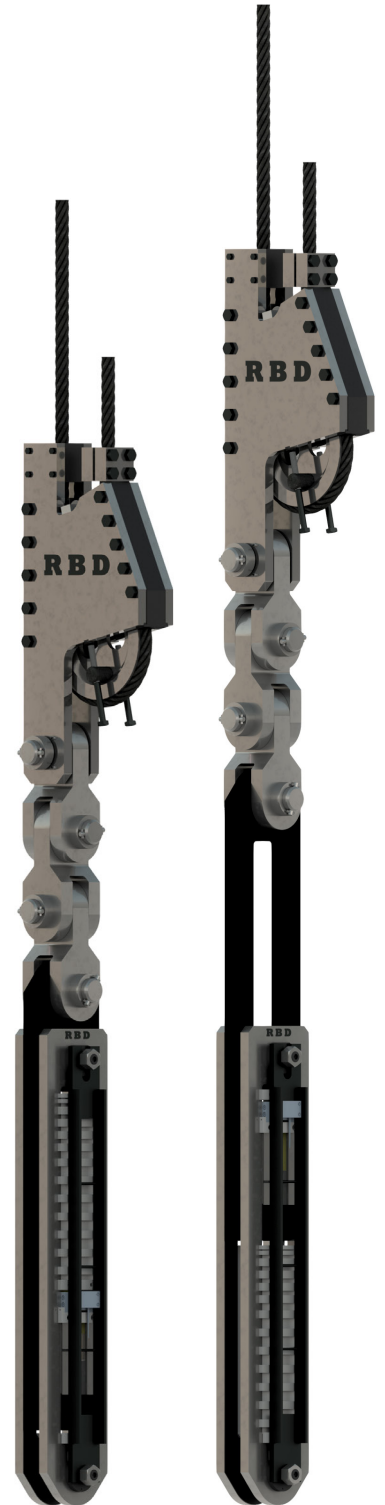


# HOIST ROPE SYSTEMS



Koepe hoist rope attachment strings should allow sufficient adjustment to equalize rope tensions. Adjustment lengths can be increased and customized to suit the necessary application. More chaseblocks are commonly added for additional coarse adjustment.

Coarse and fine adjustment linkages can be connected to whichever preferred rope termination is desired. Typical hoist rope termination methods are wedge cappel, thimble cappel and open-spelter sockets.



*TYPICAL  
KOEPE HOIST  
ARRANGEMENTS*

# TYPICAL DRUM HOIST ARRANGEMENTS



Complete strings of hoist rope attachments can be designed to suit any type of conveyance drawbar. The illustrations above show two types of drawbar connections for a thimble cap termination on a single hoist rope. The 90 degree chaseblocks beneath the thimble cappel allow two planes of movement to help reduce rope wear.



# HOIST ROPE SYSTEMS

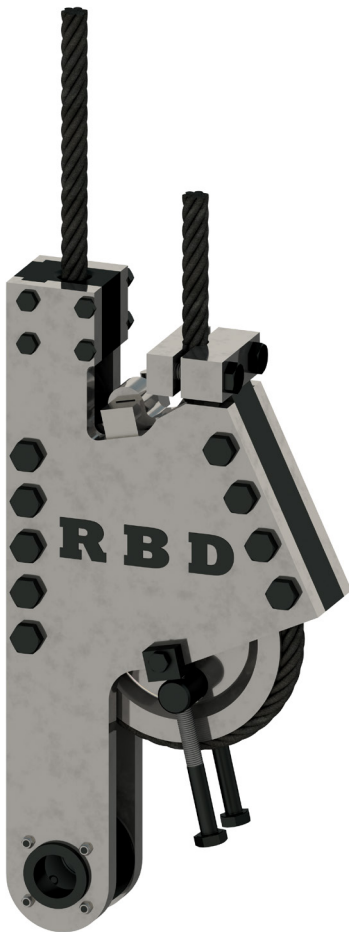
OPEN SPELTER SOCKET



## HOIST ROPE SOCKETS

The open spelter socket is an excellent hoist rope termination choice because it is reliable and robust. Reliance Barker Davies' hoist rope sockets are designed in accordance with NCB Spec. 465:1965 and are machined from a single piece of heat-treated steel. We recommend the use of Wirelock® cold socketing compound with our sockets as it has demonstrated excellent dependability and fatigue performance.

THIMBLE CAPPEL



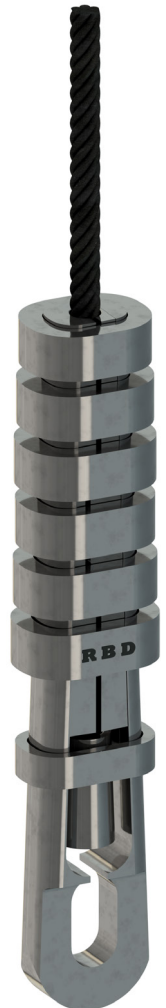
## WEDGE CAPPELS

The wedge cappel was the original product of the Reliance Rope Attachment Company Ltd. Today, wedge cappel continue to serve as a reliable rope termination option which is still preferred by many mining industry professionals.

## THIMBLE CAPPELS

Reliance Barker Davies has been designing and supplying thimble cappel since the 1980s. Thimble cappel are used for stranded hoist ropes on both drum and friction hoists. The main advantage of using a thimble cappel is a faster capping time: there is no need for stringent rope cleaning as with wedge cappel and no brooming and curing times as with sockets.

WEDGE CAPPEL



TYPICAL  
BALANCE ROPE  
ARRANGEMENTS

BALANCE ROPE THIMBLE  
TERMINATION



SHORT LOOP CAPPEL  
TERMINATION





# BALANCE ROPE

## SYSTEMS

OPEN SPELTER SOCKET  
TERMINATION



### BALANCE ROPE THIMBLES

We offer solid thimble termination options for balance ropes. Our 3-part rope clamps provide exceptional grip and help to reduce localized stresses on the rope.

### SHORT LOOP CAPPELS

Reliance Barker Davies' short loop cappelles have the same basic design and operating principle as the wedge type hoist rope cappel. However, short loop cappelles are lighter in weight and have a lower safe working load specifically for balance rope applications.

### BALANCE ROPE SOCKETS

Reliance Barker Davies' balance rope sockets are designed in accordance with BS 463-2:1970. They have a minimum static factor of safety of 10:1.

TANG-TANG



JAW-TANG



### SWIVELS

Swivels are an essential component of most balance rope arrangements. Reliance Barker Davies' swivels are specially designed to endure the harsh conditions in deep mining environments. The overall static factor of safety is 10:1, and any axially loaded threads are designed to have a minimum static factor of safety of 15:1.

Reliance Barker Davies' swivel components are fully machined from the solid. Our designs use angular contact bearings to increase life and reduce internal torque. Swivels are available in tang-tang, jaw-tang, and jaw-jaw arrangements.

TYPICAL  
BALANCE ROPE  
ARRANGEMENTS

# CHEESEWEIGHT TENSIONING SYSTEMS

Cheeseweight tensioning systems can only be installed in mine shafts that have the required amount of space at the shaft bottom to accommodate their large size. Additionally, cheeseweight tensioning arrangements must be compatible with the shaft steel design.

The main benefit of a cheeseweight tensioning system is that rope tension remains constant and never needs to be adjusted.

In order to save on critical-path shaft time, we recommend pre-hanging (“banking”) the cheeseweight assemblies before roping-up. The triangular links at the top of the cheeseweight assemblies allows for an easy transfer from the banking arrangement to the guide rope attachments.

## ADVANTAGES

- Temperature changes do not affect rope tension.
- “Set and forget” system: there is no need for regularly adjusting rope tensions.

## DISADVANTAGES

- Requires a lot of space at shaft bottom.
- Cheeseweights must be considered in the shaft steel design.
- Inspection can be difficult.
- Difficult to alter tension after installation.

HEADFRAME



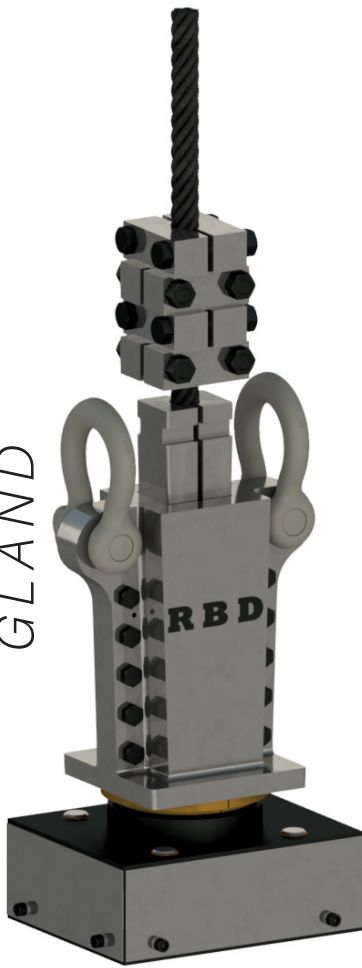
SHAFT BOTTOM



# GUIDE ROPE SYSTEMS

SPHERICALLY SEATED GLAND

GLAND



## SPHERICALLY SEATED GLANDS

Spherically seated glands have features that are particularly suited for suspending guide ropes and rubbing ropes. The spherical seating enables the rope to be turned periodically to promote even rope wear and makes vertical alignment of the gland easier.

## LONG LOOP CAPPELS

Long loop cappelles have the same basic design and operating principle as hoist rope wedge cappelles. However, long loop cappelles are designed to allow for additional rope to be threaded past the cappel loop that eliminates the need to cut ropes to exact lengths. Additionally, this allows for a spare rope length to be kept at the end of the termination which may be advantageous.

OPEN SPELTER SOCKET



## GUIDE ROPE SOCKETS

Reliance Barker Davies' guide rope sockets are designed in accordance with NCB Spec. 465:1965 and are machined from a single piece of heat-treated steel. We recommend the use of Wirelock® cold socketing compound with our sockets as it has demonstrated excellent dependability and fatigue performance.

LONG LOOP CAPPEL



TYPICAL  
GUIDE ROPE  
TERMINATIONS

# CCM TENSIONING SYSTEM

HEADFRAME

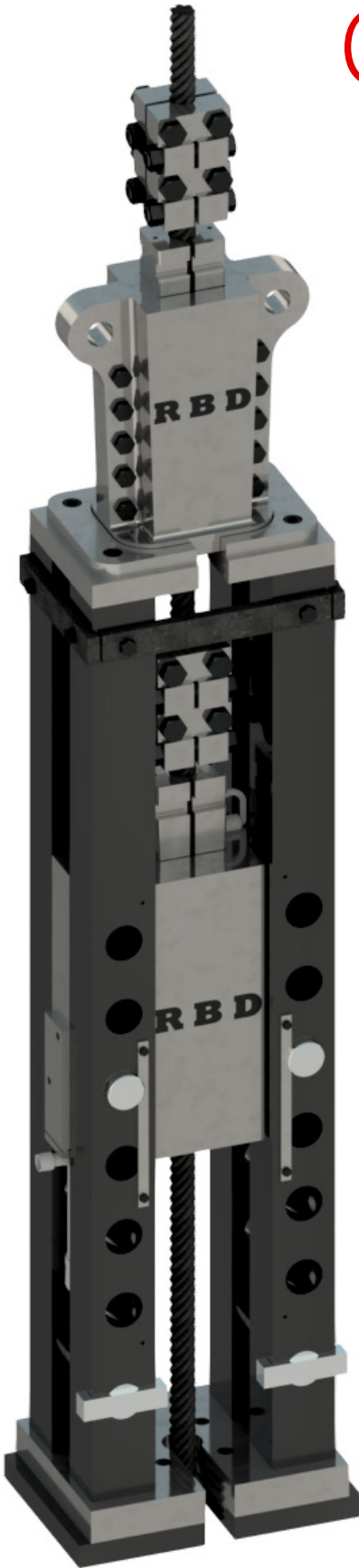
SHAFT BOTTOM



The Reliance Barker Davies Close-Control-Monitoring (CCM) system is an exceptional method for suspending, tensioning and monitoring guide ropes or rubbing ropes.

# GUIDE ROPE SYSTEMS

CCM TENSIONING TOWER



Underground, each guide rope (or rubbing rope) is typically anchored using either a gland or lug affixed to the shaft-bottom steel. In the headframe, each rope will have a CCM tower directly above its position.

Each rope is suspended within the CCM gland that is fitted inside the four CCM tower columns. The CCM gland may be lowered or raised using a pair of hydraulic cylinders to achieve the desired rope tension.

The CCM gland is supported by two load-cell pins that evenly take the full load of the suspended rope in addition to the applied rope tension. The load-cell pins produce an load reading in real time so that the rope tension can be adjusted if necessary. The load-cell outputs can be wired into the mine's PLC system and can be monitored remotely.

The top "temporary" gland is used to "leap-frog" the CCM gland until the desired rope tension can be achieved. The entire tensioning process can be completed quickly and without having to enter the shaft compartment.

## ADVANTAGES

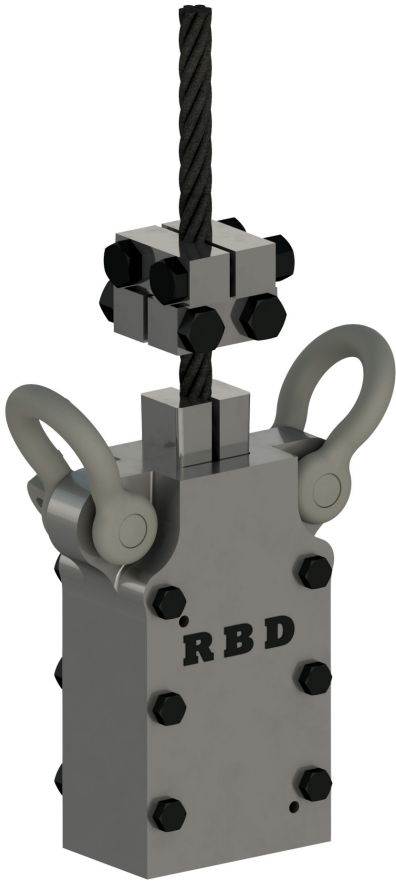
- Requires very little space at the shaft bottom.
- Rope tensions may be altered easily after installation.
- No cheeseweight construction required.

## DISADVANTAGES

- Not a "set-and-forget" system.
- Temperature changes affect rope tension.
- Load cells require regular calibration.

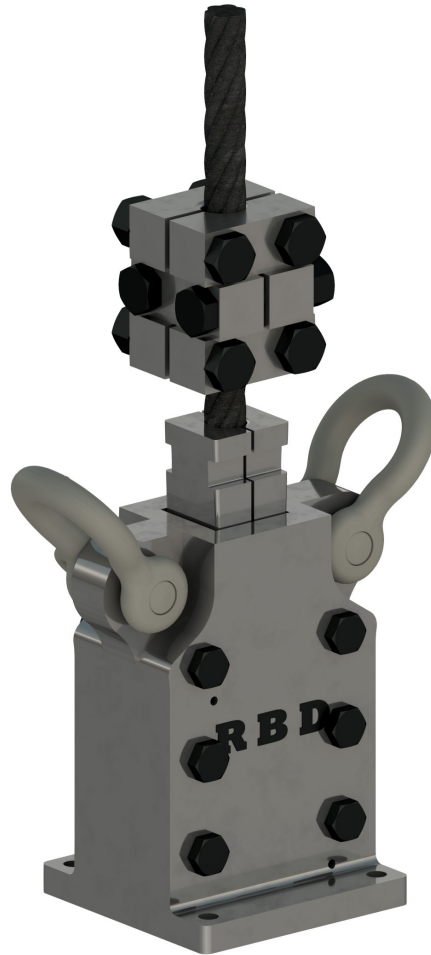


# GLANDS



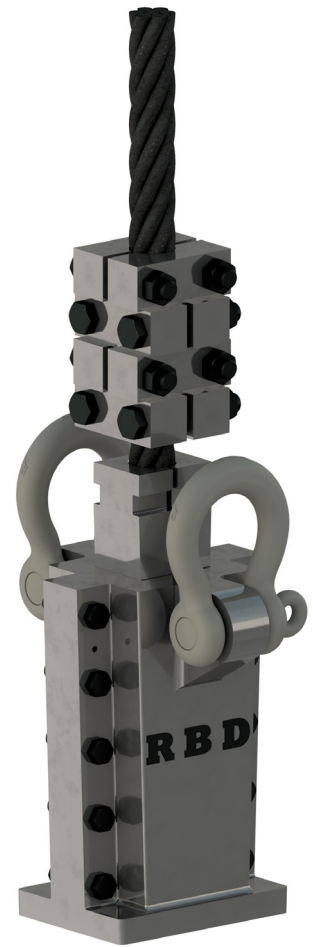
## TYPE UF

Underframe (UF) glands have a simple, functional design. They are suitable for ropes of all sizes and construction.



## TYPE NU

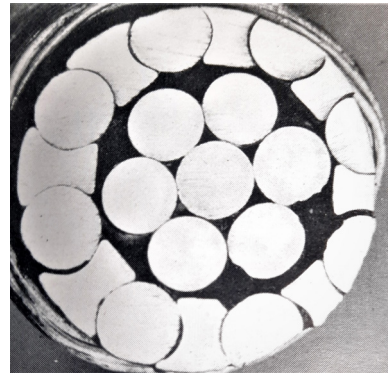
NU glands function as both an over-frame or underframe gland. Their flat base allows for bolted connections to the shaft steel or headframe girders making them the optimal choice for suspending guide ropes and rubbing ropes.



## TYPE MG

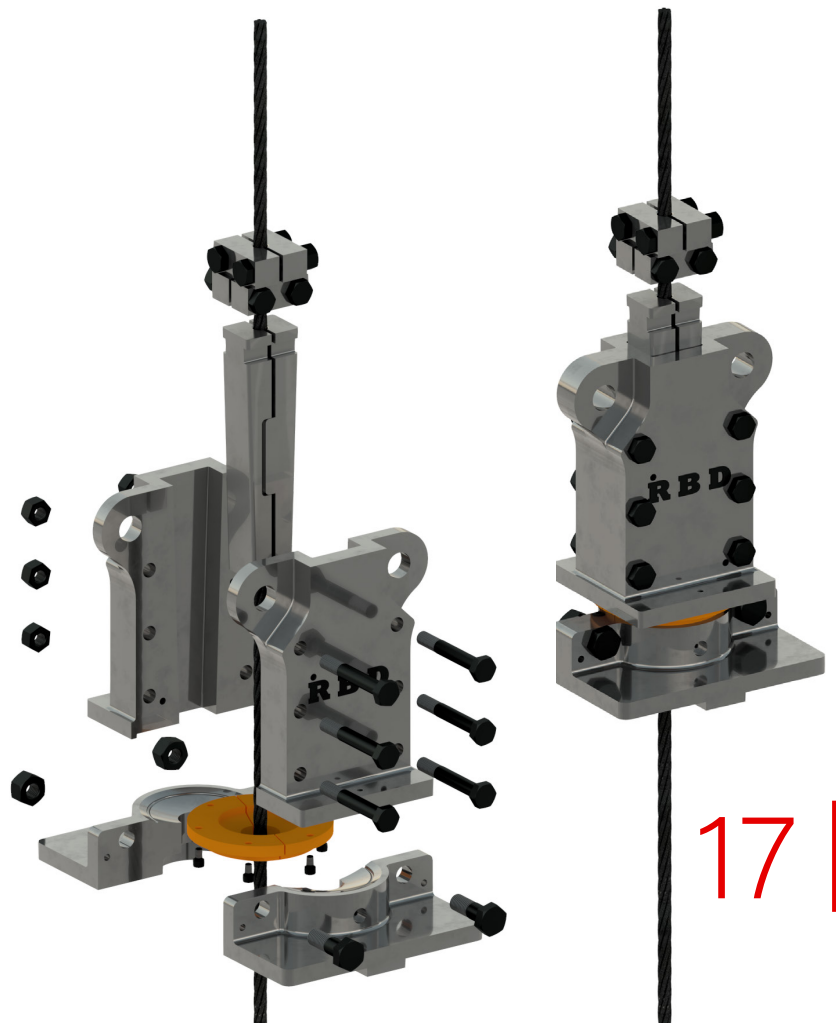
Maneuvering glands (MG) are used for lifting, maneuvering, tensioning or suspending all rope types during installation and maintenance. The main advantage of a maneuvering gland is that the gland casing can be split while the gland is suspended. This feature allows for convenient installation at any accessible location on the rope.

# GLANDS



## *SPHERICALLY SEATED*

The type SS/WF/NU is an “NU” style gland with a spherical seating. The spherical seat allows for the suspension gland to be periodically turned in order to evenly distribute rope wear on the circumference of the guide rope. The spherical seat also provides compensating adjustment for uneven load bearing and ensures that the gland is seated vertically.

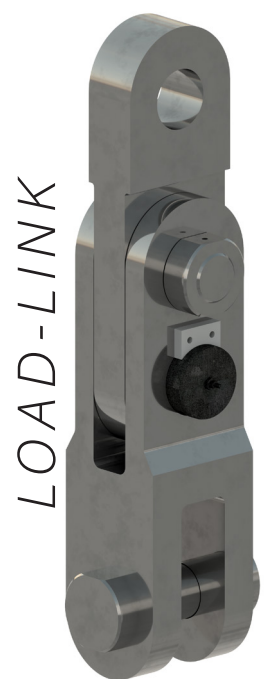


# GALLOWAY AND WORK-STAGE SUSPENSION



## INTELLIGENT STAGE SUSPENSION

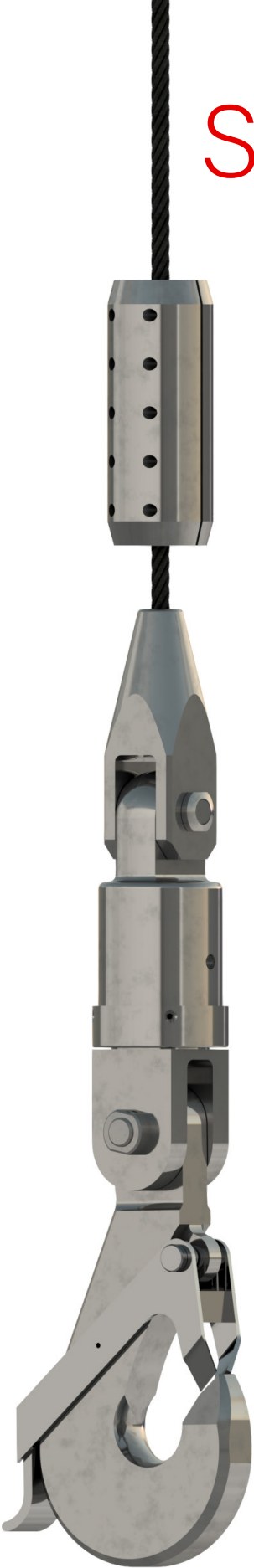
Reliance Barker Davies offers integrated load-monitoring solutions for galloway or work-deck suspension. Implementing live load-monitoring improves safety and performance by giving real-time load readings. This provides a means of ensuring that suspension rope tensions are distributed evenly. The load cell outputs can also be integrated into the hoisting system to notify of an overload or hang-up.





# SHAFT SINKING EQUIPMENT

CLIVVY HOOK  
SWIVEL  
SOCKET  
ROPE BUTTON



Reliance Barker Davies offers a wide selection of components that can be custom tailored to your application to help ensure a safe and reliable shaft sinking operation.

Our shaft sinking equipment is designed to withstand harsh shaft sinking environments.

Shaft sinking swivels are designed with a minimum 10:1 safety factor. All loaded threads are designed with a minimum 15:1 safety factor.

Clivvy hooks can be customized to your preference. We offer both spring latches and gravity latches.

## RECERTIFICATION

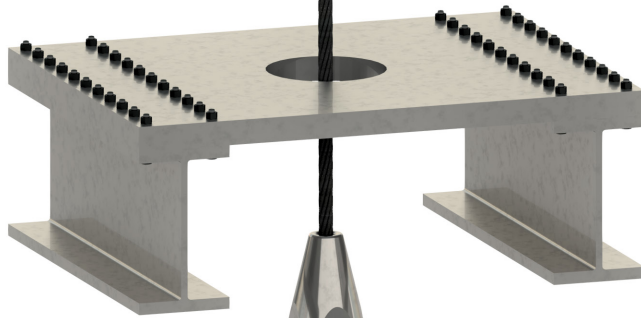
As with all our products, we provide inspection and recertification services for sinking attachments. Our rigorous inspection methods will ensure that your gear is suitable for continued use.

SINKING BUCKET

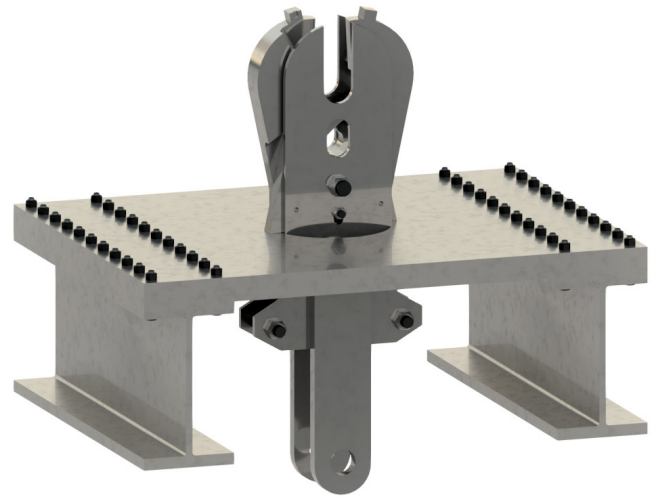


# SAFETY DETACHING HOOKS

CATCHPLATE



DETACHING HOOK



The detaching hook is incorporated in the hoist rope attachment string of a drum winding system in order to detach the hoist rope from the conveyance in an overwind situation. Once the hoist rope has been detached, the detaching hook remains suspended from the catchplate.

# DETACHING HOOKS AND CATCHPLATES



## *DETACHING HOOKS WITH "MANCANE" LATCHES*

The detaching hook is comprised of a pair of pivoting inner plates which are able to pivot within two outer plates when they strike the catchplate. Detachment is initiated when the detaching hook is pulled through the catchplate located in the headframe below the head sheave. When the inner plates contact the catchplate, they are forced to "scissor" open. After opening, the inner plates are locked in the detached position which releases the hoist rope. The geometry of the detaching hook does not allow for it to fall back through the catchplate once it has scissored open. Thus, the conveyance will remain suspended from the catchplate.

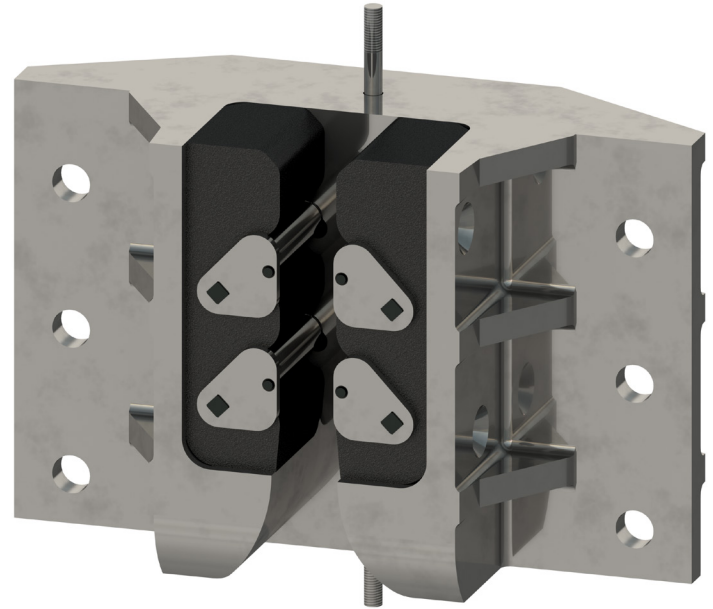
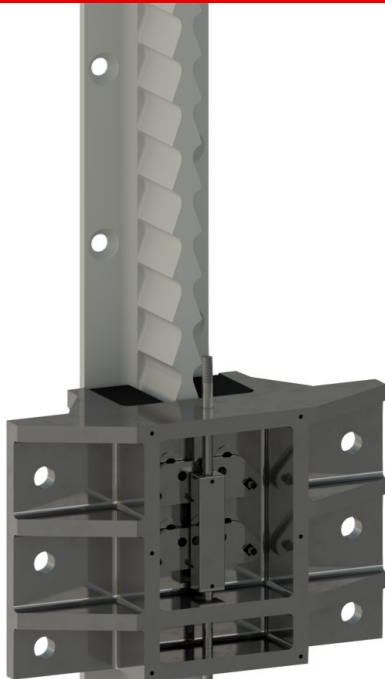
Reliance Barker Davies detaching hooks are unique in incorporating "Mancane" Latches to prevent accidental one-sided opening.



# RELIANCE-WORRALL CATCHGEAR

PAWL BOX

TOOTHED RACK



## RELIANCE-WORRALL CATCHGEAR

The Reliance-Worrall catchgear design comprises of toothed racks and corresponding pawl boxes. When the conveyance ascends beyond its normal operating elevations the toothed racks will enter their corresponding pawl boxes.

Each pair of rollers in the pawl box are spaced 1.5 tooth pitches apart thus reducing the maximum conveyance fall back to half a tooth pitch. This reduces shock-loading on the shaft steel and conveyance. Shock absorbers (not shown) are incorporated into the system to reduce impact.

### ADVANTAGES

- Suitable for smaller conveyances only. Each pawl box has a capacity of 7,620 kg. Two pawl boxes would therefore support a loaded conveyance of 15,240 kg.
- Very low fall back averaging 12.7 mm. This reduces the impact loading.
- Pawl boxes can be mounted on the conveyance or headframe.
- Can be fitted with a remotely operated release mechanism to speed up the recovery of a conveyance.
- Designed for low maintenance.

# CATCHGEAR

## SYSTEMS

### *BARKER-DAVIES CATCHGEAR*

The Barker-Davies catchgear design can be suited to any size conveyance. The design is particularly robust with features designed to reduce maintenance.

The Barker-Davies catchgear design is comprised of several pawls which are mounted on pivot pins within a robust structure. Top and bottom plates are fitted to allow the column to be integrated into various headframe arrangements.

As a conveyance approaches the catchgear, it strikes the pawls which then pivot and allow the conveyance to pass upwards. As the conveyance passes, the pawls are forced back into their operating position that catches the conveyance when it descends. Shock absorbers (not shown) are incorporated into the system to reduce impact.

### ADVANTAGES

- Suitable for all sizes of conveyances.
- Fall back is higher than the Reliance-Worrall. It varies depending upon the capacity. An average would be 60 mm.
- To achieve this fall-back distance, a rack is required and this is usually mounted on the conveyance.
- May also be fitted with a release mechanism.
- The pawls are positively returned to the operating position by the movement of the conveyance.



*INSPECTION AND  
RE-CERTIFICATION*

*INSPECTION &  
OVERHAUL SERVICE*

Our comprehensive inspection service includes ultrasonic, fluorescent magnetic particle inspection, visual examination and dimensional verification.





# RE-CERTIFICATION SERVICES

## THE IMPORTANCE OF REGULAR INSPECTION

Rope attachments are subject to varying degrees of corrosion and wear depending on shaft conditions and workload. Regular inspection is essential and is a regulatory requirement in most countries. It is important to recognize that if problems go unnoticed and repair and maintenance measures are not taken an attachment can fail. To help maintain the highest possible level of equipment safety RBD recommends that the owner-operator makes a thorough visual inspection of their attachments on a regular basis.

Our Inspection & Re-certification service meets all statutory maintenance requirements. We have considerable experience identifying issues with mechanical wear, corrosion and adverse fatigue conditions in attachments.

## TRACEABILITY

100% traceability is essential for mine rope attachments and is mandatory in many jurisdictions. Reliance Barker Davies maintains a detailed archive of all components, manufactured and overhauled. All RBD attachments can be traced by their unique serial number (hard stamped on each component) and from the original certificate of manufacture.

## INSPECTION & TECHNICAL CONSULTATION

We recommend that original equipment should be sent to Reliance Barker Davies for Inspection and Re-certification. Our rigorous inspection methods allow us to determine if a component is fit for continued use. The inspection/overhaul frequency is usually determined by the owner.

The frequency of inspection should be based on several factors, including:

- Number of cycles.
- Wet or dry shaft.
- Corrosive and acidic properties of the shaft environment.
- Condition of paint or outer protective layer.
- Wear / damage.

Customers participating in the Inspection & Re-Certification program will receive an Examination Report and if necessary, any recommendations for repair & maintenance. If you would like further information about the Inspection & Re-Certification Service in Canada or elsewhere in the world, please contact us.

## CUSTOM DESIGN & MANUFACTURE

We can assist with the design of:

- Suspension equipment for all types of mine conveyances used in drum winding or multi-rope friction installations.
- Balance rope suspension equipment.
- Guide rope arrangements and all components for the suspension and tensioning of guide ropes.
- Various rope handling components.
- Engineered fall protection systems.
- Suspended work stages.
- Engineered lifting lugs.
- All types of rope fittings for aerial ropeways.
- Attachments for rope haulage systems.
- Equipment for the maneuvering, anchoring, suspension or tensioning of wire ropes used under heavy tensions in industry or civil engineering projects. For example: masts stays, bridges, offshore oil rigs etc.



# TECHNICAL SERVICES

## SITE ASSISTANCE AND QUALITY ASSURANCE

### WHY CHOOSE OUR SERVICES?

The performance of Reliance Barker Davies mine rope attachments is dependent on the correct installation procedures being followed. Owing to the criticality of mine rope attachments, it is essential that they are installed by qualified, experienced and competent personnel.

### QUALITY ASSURANCE

Reliance Barker Davies personnel are highly experienced in the proper installation of our products. As such, we offer qualified personnel to assist with installation.

### ON-SITE SOCKETING

The performance of an open spelter socket termination is largely dependent on the implementation of the correct capping procedures and the correct application of cold socketing compound (resin). Incorrect socket capping can result in an unsafe termination which may fail below the intended designed limits. We can provide personnel who are qualified in socketing.







## **NORTH & SOUTH AMERICA**

Reliance Barker Davies Inc  
2777 Belisle Drive,  
Val Caron  
Ontario, P3N 1B3  
Canada

Tel: +1-705-897-2828  
Fax: +1-705-897-1101

Mr. Stephane Godin - President  
[steph.godin@reliancebarkerdavies.com](mailto:steph.godin@reliancebarkerdavies.com)

## **UNITED KINGDOM**

Reliance Barker Davies Ltd  
Tel: + 44 1446 393371

David Phillips - Managing Director  
[dphillips@reliancebarkerdavies.com](mailto:dphillips@reliancebarkerdavies.com)

**[reliancebarkerdavies.com](http://reliancebarkerdavies.com)**