

These flashes summarise key safety matters and incidents, allowing wider dissemination of lessons learnt from them. The information below has been provided in good faith by members and should be reviewed individually by recipients, who will determine its relevance to their own operations.

The effectiveness of the IMCA safety flash system depends on receiving reports from members in order to pass on information and avoid repeat incidents. Please consider adding the IMCA secretariat (imca@imca-int.com) to your internal distribution list for safety alerts and/or manually submitting information on specific incidents you consider may be relevant. All information will be anonymised or sanitised, as appropriate.

A number of other organisations issue safety flashes and similar documents which may be of interest to IMCA members. Where these are particularly relevant, these may be summarised or highlighted here. Links to known relevant websites are provided at www.imca-int.com/links. Additional links should be submitted to webmaster@imca-int.com

I Crewman Received 440V Electric Shock

A member has reported an incident in which an electrician received a 440V electric shock and sustained an electric burn on the left middle finger and an abrasion on the right palm.

Whilst undergoing refit works at a repair yard, an electrician was checking the electrical systems on the newly installed temporary living quarters (TLQ) when he saw that the power supply cable (4-pin-male plug) was disconnected from the socket/isolator. He attempted to plug in the supply cable and subsequently received a 440V electric shock. He was slightly injured and was attended by medical personnel onboard the vessel and ECG (electrocardiography) was administered. He was admitted to hospital for 24 hours and subsequently placed on light duties.

The company made the following observations:

- ◆ The electrical works including commissioning for electrical systems on the TLQs were already completed;
- ◆ Following this, the supply lead had been removed from the socket but the supply had not been isolated;
- ◆ The electrician was called to investigate why there was no power in the TLQs;
- ◆ There were a large number of sub-contractors working on the installation at the time of the incident;
- ◆ The 440V power supply was not isolated from the main switchboard prior to connection;
- ◆ TLQs were supplied with female sockets which resulted in the extension cable having a live male end.

The company made the following changes:

- ◆ The sockets on the three TLQs on board the installation were changed for male sockets such that the live supply wires have safer female plugs;
- ◆ The manufacturer of the TLQs was informed of this potentially hazardous arrangement of power supply sockets;
- ◆ The importance of rigorous lock-out tag out procedures was reinforced to crew and fleet.



Male socket



Female socket

2 Near Miss: Improper Use of Fall-Arrest Equipment Leads to Fall

A member has reported an incident in which a rigger fell approximately one metre into the sea during rope access work. The rigger was able to climb back up to the fairlead access platform opening. There were no injuries and no emergency rescue was required.

Two riggers were required to remove the pennant wire and clamp from an anchor wire so that recovery of the anchor could continue. The task involved rope access and positioning from the outboard railing using a fairlead access opening to a working platform in order to reach the clamp and pennant wire socket connection (shackle).

The rope access attachment was a 'shark hook' and strop configuration. One rigger selected a strop that provided movement of the connection point so the anchorage point would be under vertical tension. The other rigger selected a shorter strop and one designed to wrap around beams that may have sharp corners. This strop incorporated a one sided rubber liner to protect the integrity of the strop material which also prevented free movement. The final arrangement on this strop had the triangular D-ring adjacent to the choked position. This beam strop and rope access connection was completed from the inboard deck space and not adjusted to the outboard position in a direct line of tension, as should have been done, and the strop was unable to slide around into an ideal position. The rigger using this configuration was applying pressure to the rope access equipment to a position opposite the other rigger, when his shark hook and strop D-ring disconnected causing him to slip approximately one metre into the water.

During the company's investigation the following points were noted:

- ◆ An incompatible strop/connector was selected and used as an attachment point (choked around outboard railing). This should not have been permitted;
- ◆ The rigger did not check the double action connection was engaged and under vertical tension prior to descending into position;
- ◆ There was no dedicated spotter;
- ◆ The lanyard connector and anchor point set up enabled 'roll out' to occur through side loading on the primary locking device;
- ◆ No secondary safety line was used.



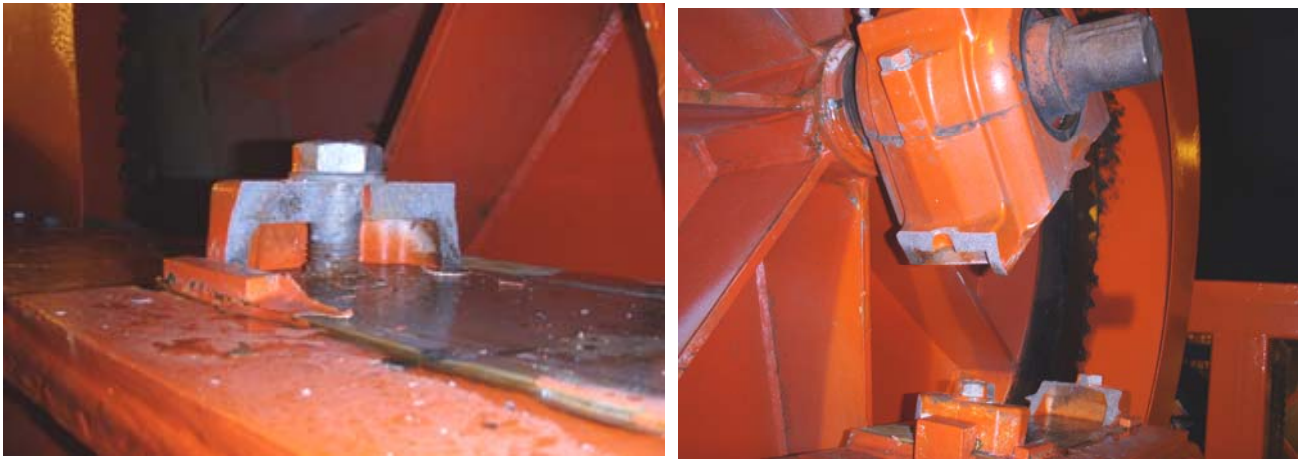
The company made the following actions and recommendations:

- ◆ The type of strop and descending device was changed out before work continued;
- ◆ Personnel were briefed on principles of 'dynamic roll-out' and the correct selection of rope access, anchorage points and fall restraint equipment;
- ◆ Specialist equipment for 'over the side' work should be purchased as a matched set, clearly identified, inspected and kept together at all times for specific 'over the side' tasks;
- ◆ Working at heights awareness training should be a prerequisite for any task requiring the use of fall restraint equipment. Training in rescue equipment and techniques should also be a minimum standard for spotters.

3 Failure of Hose Reel Bearing Housing

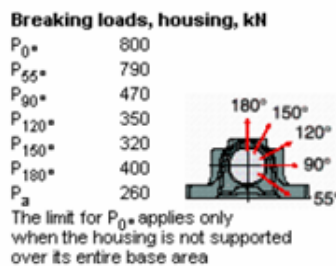
A member has reported a serious failure of a shaft bearing housing on a hydraulic winch rented from a third-party contractor. During recovery of a load from the seabed, the shaft bearing housing broke. The winch wire raced out 2-3 metres before the drum got stuck in the casing and stopped rotating. The 'fail-safe' brakes of the winch did not engage when

the drum became misaligned. The winch was certified to SWL (safe working load) 17 Te, while the load at the time of the incident was approximately 8 Te. There were no injuries.



During the company’s investigation the following points were noted:

- ◆ A laboratory test revealed that the winch had been exposed to repetitive overload prior to being taken onboard the company’s vessel, causing cracks in the bearing housing to develop over time;
- ◆ During preparation of the winch prior to mobilisation on the vessel, the certification body required a reinforcement of the winch frame at the motor side. This could have been an indication that the winch frame had been sagging at the motor side (where the bearing housing broke) which may have contributed to the damage;
- ◆ The winch was ostensibly certified to DNV Rules for Certification of Lifting Appliances, 1994. However, a review of the design documentation for the winch and bearing/housing compared with this certification revealed that the winch assembly was not compliant in several areas:
 - with a winch SWL of 17 Te, calculations carried out by the engineering team showed that the breaking load of the bearing housing should be 76 Te according to the DNV Rules for Certification of Lifting Appliances 1994
 - the design calculations initially carried out by the winch manufacturer were based on a load angle of $0\pm 30^\circ$. Within this area the breaking load of the bearing housing is 79 Te. The winch had later been fitted with a spooling device changing the load angle to $120-150^\circ$ but no new design calculations were carried out for the new setup/angle. The datasheet for the bearing/housing stated that the breaking load at this angle was reduced to 32-35 Te, less than half of what is required for the SWL to which the winch was certified



Theoretical breaking loads on winch bearing housings

- this winch does not have a secondary band brake, but only brakes from the hydraulic transmission system.
- the calculations also showed the brake capacity was too low for the indicated SWL of the winch. DNV Lifting Appliances 1994 Section 5 B307 states that minimum brake capacity is to be 80% in excess of SWL, i.e. $17 \times 1.8 = 30.6$ Te, while the braking capacity of this winch was defined to be 25.5 Te
- during a complete refurbishment of the winch in 2006 the same bearing with housing was replaced due to cracks and damage on the housing. No investigation was done into why or how this damage had developed;
- ◆ If the winch, with the spooling device fitted, had been exposed to loads up to its SWL and additionally been load tested to $SWL \times 1.1$, this would have significantly increased the risk of damaging the shaft bearing housings and explains the low cycle fatigue damage of the axle bearing housings;

- ◆ Further, as no non-destructive testing (NDT) was carried out on the winch bearing housings and the visual check did not reveal any damage, it was not possible to identify the cracks during mobilisation preparations.

Based on these findings it was found to be clear that this winch was not suitable to be used to a safe working load of 17 Te. However, without regular NDT of winch bearings and other load bearing parts on winches, this could have happened to basically any winch in operation, especially when any modifications have taken place.

The company suggested the following actions:

- ◆ Establish procedures for NDT of all load bearing parts as part of routine maintenance and/or mobilisation checks for winches and other lifting appliances;
- ◆ Consider failure mode and effects analysis(FMEA)/criticality analysis for all such equipment, addressing single failure points such as bearings and brakes;
- ◆ Consider whether NDT is sufficient to find defects if secondary braking is in place;
- ◆ Ensure that winches and other lifting appliances fulfil the requirements of the rules and standards to which they were designed and certified. If the design basis has changed, for example, by changing the wire angle, ensure that design calculations consider the new scenario;
- ◆ For future lifting operations the company recommended that such winches should not be used without a proper drum disk brake, since there was no proper second barrier for safety. This was also noted to be the recommendation in the DNV lifting Appliances Rules section 5 B306.

Members may also refer to IMCA SEL 019 – *Guidelines for lifting operations* – for further assistance and information on lifting.

4 Inadvertent Opening of Circuit Breakers

A member has reported an incident in which an essential 440V circuit breaker onboard a vessel was inadvertently opened, in error, by an engineer. Whilst there was no injury, damage or loss of position keeping capability, the incident had a significant cost in terms of vessel downtime and project delays.

The vessel was working very close (within 500 metres) to a floating offshore structure and an ROV was deployed at the time. A vessel engineer was asked to check the status of a crane breaker in the switch room. However, in doing so he pressed the open/reset command buttons on the switchboard and inadvertently caused the ‘essential services’ circuit breaker to trip out. The incident resulted in the recovery of the ROV onboard and the vessel moved away from the floating offshore structure whilst an investigation into the cause of the incident was carried out.



Switchboard open/reset command buttons



Switchboard crane breaker

The company conducted an investigation and identified a number of issues:

- ◆ Supervision and control of the work was not effective:
 - the engineer acted contrary to the instructions given, which were to check the status of the aft crane breaker and report back
 - the engineer decided on his own initiative to reset the breakers. In this context he did not fully understand his job role and responsibilities or the limits of his authority for critical operations
- ◆ The information given by various indicators and signs was unclear:

- the breaker status lights showed ‘orange’ (amber) as the normal operating condition. This was potentially confusing and should ideally be ‘green’ to reflect a more obvious normal operating condition
- labelling explaining the function of the breaker command buttons (open/reset) on the switchboard was not sufficiently explicit and was open to interpretation
- a large amount of signage had accumulated over time on the switchboard room doors, some of which was unnecessary, and the sign for ‘authorised personnel only’ was not sufficiently prominent;
- ◆ Barriers and controls were not adequate:
 - the doors to the vessel switchboard rooms were not locked and entry could be gained by any onboard personnel. These are critical areas and entry should be strictly controlled;
- ◆ Existing procedures were not adequate and were not followed:
 - there was no procedure or work instruction to control entry to the switchboard room or operation of the breakers by others and the chief engineer’s standing orders were not sufficiently explicit in this area
 - a record of the vessel engineer having completed a formal engine room familiarisation was not available, and a number of competence portfolios, including that of the vessel engineer, had not been completed or verified
 - the chief engineer’s standing orders were not signed by the full complement of vessel engineering personnel.

The company implemented a number of specific actions to prevent recurrence:

- ◆ Chief engineer’s standing orders were amended with instruction that the electrician is the nominated person responsible for operation of the equipment within the switchboard rooms and on the switchboards. In his absence, only the duty engineers who have been formally familiarised and assessed as competent may carry out switchboard operation, with regular documented familiarisation tours to ensure the duty engineer is suitably knowledgeable and familiar;
- ◆ Chief engineer’s standing orders were amended with instruction that all doors to switchboard rooms should be kept locked at all times when no work is ongoing in the room. Nominated key-holder arrangements should be put in place to ensure robust control of entry to the switchboard rooms;
- ◆ All vessel engineering personnel should sign off on having read and understood the chief engineer’s standing orders and these should be regularly reviewed and updated;
- ◆ A review of whether or not all personnel have undergone the vessel specific familiarisation required for their role, with an adequate record of this having taken place;
- ◆ A review of the competence portfolios of all vessel personnel in order to establish the status of their assessment and verification of personnel competence.

5 Hole Burnt in Vessel Deck During Removal of Sea-Fastenings

A member has reported an incident in which two holes were burnt in the deck of a vessel by a third party contractor during hot work. At the time of the incident the vessel was in port carrying out a number of activities including the burning off of a large quantity of deck sea fastenings. A specialist sub-contractor known to have experience in the removal of sea fastenings had been engaged to carry out this work.

The sub-contractor was briefed and familiarised with the work site in accordance with company procedures and the workers were all fully aware of the requirement to burn off the sea fastening cleats at greater than 3mm above deck level. All appropriate hot work permits and relevant precautions were in place including a fire watch.

The sub-contractor’s team commenced removal of the sea fastenings in various locations around the deck and during the course of a day successfully removed a large quantity of sea fastenings without incident.

Work on the after deck included the removal of a number of sea fastening cleats from around a reel cradle, in preparation for the lifting of the reel from the deck. Whilst removing the last of these cleats one of the contractors burnt two holes in the deck at either end of the cleat. Molten metal fell through the holes in the deck and ignited a coil of plastic hose stored in the space immediately below which began to smoulder and give off a quantity of black smoke. The fire watch immediately noticed smoke from that area and using radio, informed the individual carrying out the burning to stop work immediately. The fire alarm was then raised.

No injuries were caused as a result of the incident. However, any damage to a vessel deck is potentially very serious and the incident could have had the potential for more serious consequences.



Hole burnt in deck



Damaged plastic hose in space underneath

Investigation and Lessons Learnt

The vessel fire and emergency procedures worked well and the incident was quickly and professionally contained within a few minutes. Upon investigation, it appears that the plastic hose may have been on fire due to damage it had sustained, but there was no damage to any other equipment within this space apart from superficial blackening of paint work.

Following investigation, the following was noted:

- ◆ The main contributory factor was failure to follow procedures:
 - the sub-contractor was fully aware of requirements imposed by the vessel and his own employer that sea fastenings should be burnt off 3mm above the deck. This requirement was not followed in this instance
- ◆ There was a momentary lapse in concentration allowing heat from the torch to penetrate the deck on the opposite side of the cleat being removed. The incident occurred less than two hours after a thirty minute break, and there was no pressure on the workers involved to hurry or rush the job;
- ◆ The burning torch angle should be maintained horizontal to the deck at all times during sea fastening removal. A relatively small deflection of +/- 5° could cause damage to the deck;
- ◆ The vessel fire and emergency procedures worked well. There is no doubt that the swift and professional response of the vessel crew limited the potential injury and/or damage that could have occurred had the right controls not been in place.

6 Fatality During Anchor Handling Operation

A member has reported a fatal incident which occurred during anchor handling operations. The incident occurred on an anchor handling tug (AHT) whilst crew were attempting to disconnect an anchor buoy (weighing 1.4 tons) from its pennant wire shortly after retrieval.

The anchor buoy was winched onto the deck of the AHT until the pennant was in the wire stopper used to prevent the buoy from being pulled back towards the stern by sudden tension on the pennant wire. (See Fig. 1 Step 1.) Two crew members were disconnecting a shackle between the pennant wire connected to an anchor on the seabed and the buoy on deck (See Fig. 1 Step 2), when suddenly the pennant wire came under tension. The wire stopper failed to stop the pennant wire effectively and the sudden tension on the pennant wire jerked the buoy towards the stern of the vessel. The two crew members who were busy disconnecting the shackle were struck by the moving buoy. (See Fig. 1 Step 3). One crew member died instantly, the other suffered a minor injury.

Root cause

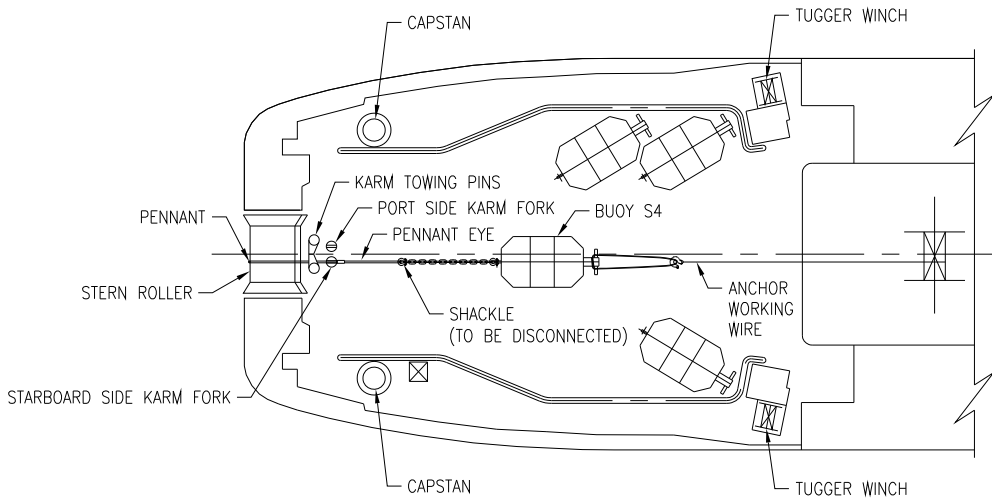
Our member conducted an investigation and the root cause of the incident was determined to be that the wire stopper failed to stop the pennant wire. This happened because an incorrect (oversized with respect to the diameter of the pennant wire) 'U-shaped insert' was mounted into the wire stopper. This 'U-shaped insert' also displayed excessive wear and tear. (See Figures 3 & 4) As a consequence of this the socket at the end of the pennant was able to pass through the wire stopper when the pennant wire came under tension.

The sudden tension on the pennant wire came about because the survey screen on the bridge of the AHT displayed a 'design anchor position' instead of the 'as laid' anchor position. Based on the information presented by the survey screen, it was assumed that there was sailing slack in the pennant wire when in fact, it was being tensioned. (See Figure 2)

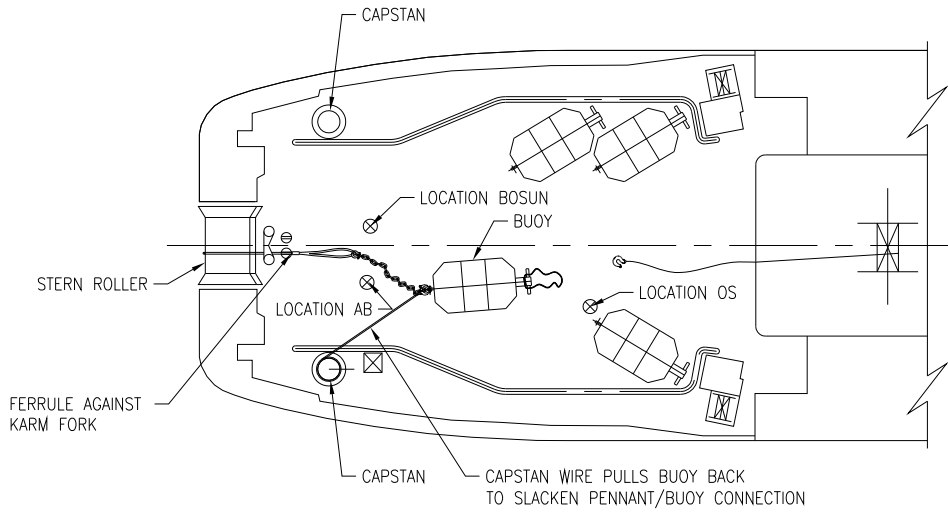
Recommendations and corrective actions

Our member made the following recommendations and corrective actions:

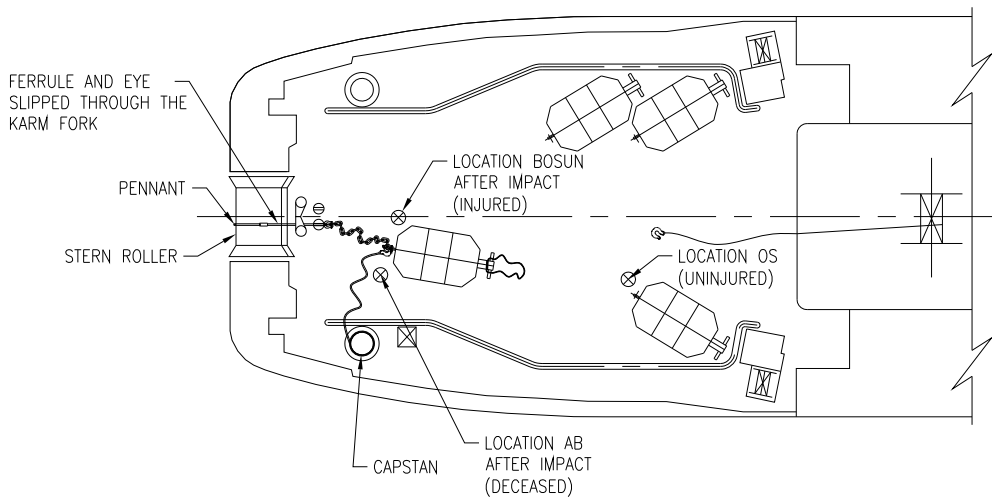
- ◆ A thorough check of the wire stopper's exchangeable parts should be made to ensure that it is adequate to handle the actual pennant wire diameter, and this should be recorded
- ◆ A monthly inspection and check on wear and tear of the wire stopper equipment should be added to the vessel's planned maintenance system
- ◆ The 'as laid' information of the anchor should be provided by the positioning subcontractor and displayed on the survey screen
- ◆ The survey screen provided by the positioning subcontractor should be considered an additional tool to provide an assumed anchor location to the AHT, but this location should never be interpreted as representing the actual anchor position. A warning message to this effect should be displayed on the survey screen
- ◆ A dedicated watch should be maintained throughout the operation of buoy recovery on the direction and tension of the pennant wire.



STEP 1. BUOY ON THE DECK



STEP 2. START DISCONNECTING



STEP 3. INCIDENT

Fig. 1 Schematic diagrams of incident

AHT MOVES FORWARD ASSUMING TO SLACKEN PENNANT WIRE BUT IN FACT TENSIONING IT

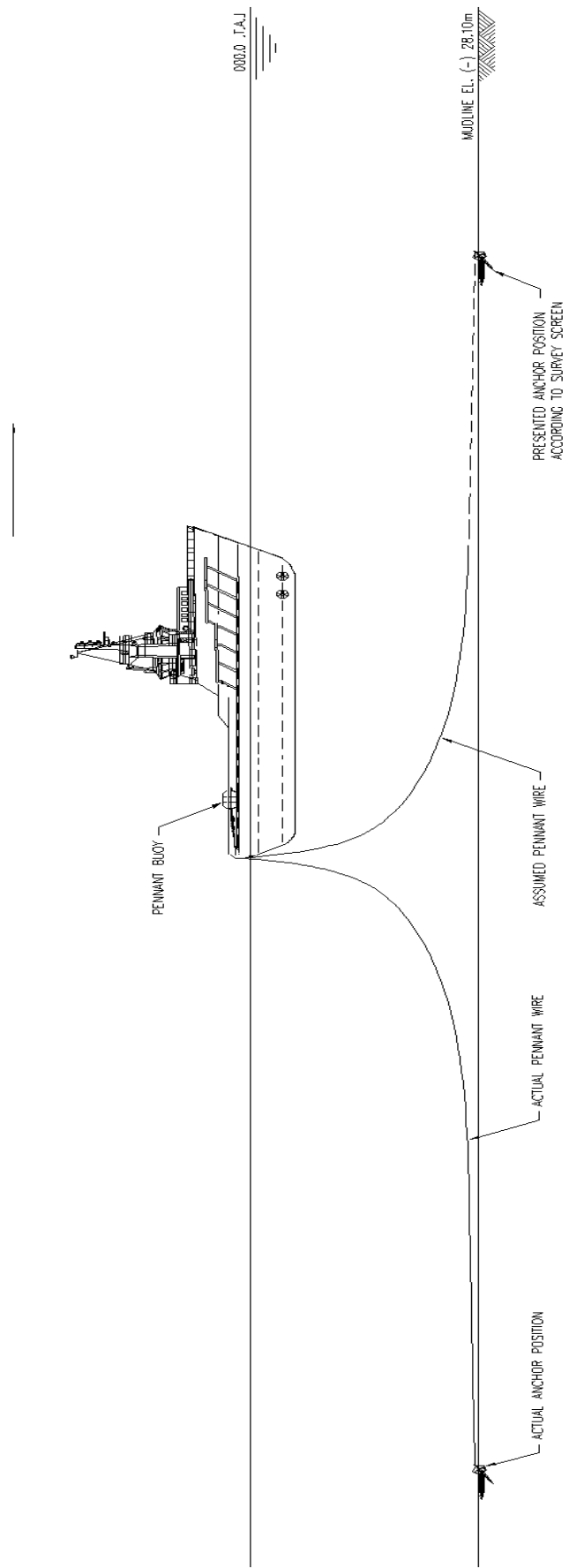


Fig. 2 Actual and design anchor positions

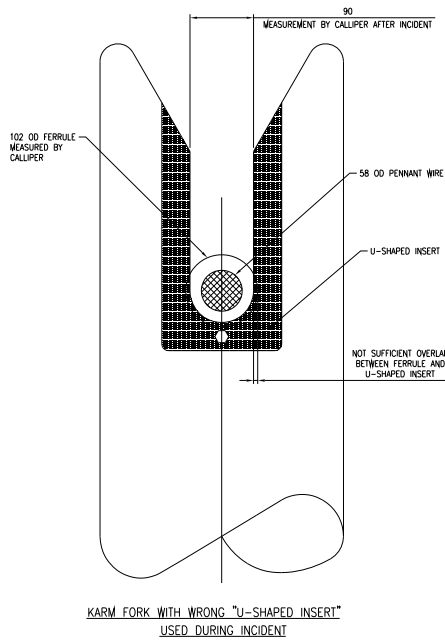


Fig. 3 Incorrect "U-shaped insert"

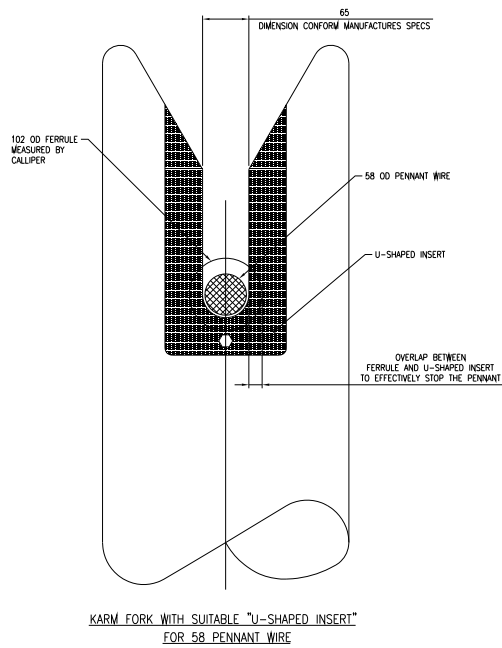


Fig. 4 Correct "U-shaped insert"