Loss Prevention Circular No. 01-11

Damage to cargoes of wind turbine blades

Introduction
As a result of the increasing number of shipments containing wind turbine blades Gard has recently been involved in a number of cases of alleged damage to turbine blades stowed both on and under deck. Among the main causes of such damages are poor welding of stoppers, handling of the blades and poor stowage. The purpose of this loss prevention circular is to provide information on the risks involved and increase the awareness needed when handling turbine blades.

Causes of damage
1. Welding
In a recent Gard case the blades were stowed below deck in the holds in stacks two or three blades high. At the discharge port, the stow in the hold collapsed causing severe damage to both the cargo and the bulkhead, which led to the vessel having to call at an intermediate port for relashing/securing of the cargo. Only one welded stopper out of nineteen was found to be still in position. The surveyor was of the opinion that the collapse of the stow was due to poor welding of the stoppers. Gard’s experience is that poor welding operations carried out by both ship’s crew and third parties appointed by the charterers/shippers is one of the main causes of loss of or damage to wind turbines.

2. Handling damage during loading/discharge.
The grouping of the blades and the size of blades varies between manufacturers. The blades are packed in different ways depending on their design, some completely packed within a steel frame (Figure 1), while others are shipped with frames at the root end of the blade and a frame somewhere at the opposite end of the gravity point. (Figure 2)

However, the cargo delivered for shipment is often unpackaged and stowed either on deck or below deck in the holds. The turbine blades are made of polyester and are therefore particularly vulnerable to transit damage, although repair is economically feasible to a certain extent.

Gard has experienced that strong winds during loading and discharge operations is a contributing factor for handling damages. Another factor is wrong determination of the structure lifting points and the centre of gravity; special attention should be given to the lifting points and the centre of gravity on the lift needs to be verified to avoid the blades becoming bent or touching other obstacles during these operations.

3. Poor stowage and/or insufficient/appropriate securing
One incident involved the collapse of a stow of turbine blades, packaged in 40’ ISO frames and stowed 3 high and 5 wide both on deck as well as in the cargo holds.

In most cases the blade units will be stowed on deck in longitudinal direction. The cargo is relatively lightweight but voluminous and therefore susceptible to wind forces. The force of the wind, which increases proportionally with the height of the stow, should be taken into consideration when calculating lashing capacity.

1 With respect to hot works to be performed on board the vessel we wish to refer to our previous LP circular No. 06-10: The danger of hot works on cargo securings.
Preventing damage
Clearly the stowage position on board ships depends largely on the size of the holds and the length of the blades to be carried. The height of the stow depends on the strength of the designed frames or cases or other manner of packaging of the blades. The preparation of the vessel to properly load/stow and secure the cargo is therefore of the utmost importance. The booking note should contain information in respect of the weight, the manner of packaging, unit weight, dimensions of the blades and maximum allowable stowage height.

Calculations should be made prior to the commencement of loading, based on the vessel’s relevant characteristics (such as length, speed, GM, stowage location on board), the cargo (dimensions and weight) and the lashing material to be used (container lashing material, chains, wires, belts, etc.). The units have to be handled with extreme care as strong winds during loading/discharging create difficulties when lifting the blades.

We do not here intend to discuss the various issues surrounding the calculation of stability aspects when loading a ship, however, during heavy weather with high seas excessive initial stability will result in rapid and violent motion which will impose large sliding and racking forces on the cargo causing high stressing on the lashings. The master should take into consideration the stability information obtained from the ship’s stability manual.

Recommendations
Members should pay particular attention to the allocation of contractual responsibility for the loading, stowage, securing and discharge operations. If the member has responsibility for any of these operations they may wish to consider appointing a competent surveyor to assist with ensuring that the operation is done properly. If the cargo is to be carried on deck, it is essential that this is clearly stated in the contract, as it will have a significant impact on the terms and conditions on which the cargo is carried. Particular attention should be paid to the welding stoppers ensuring that welding operations have been properly performed. The vessel’s Cargo Securing Manual should be approved by the relevant Flag State authority or directly by the relevant Class Society, if such authority for approval has been transferred to the Class Society by the Flag State Authority. As windmill blades are not mentioned in the list of cargoes under the section 5.3 for non-standardised stowage and securing in The Code of Safe Practice for Cargo Stowage and Securing, 2003 edition, an annex describing the general nature for the stowage and securing should be worked out and approved by the relevant Flag State authority or Class Society. Vigilance is therefore vital to ensure that stowage/lashings and securing of the cargo is in compliance with the applicable annex.

With respect to software products relating to lashing programs the relevant Class Society may be contacted for advice.

Regardless of the manner of unitising, the stowage, lashing and securing of the units of blades should be in accordance with The Code of Safe Practice for Cargo Stowage and Securing, edition 2003.

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