

## Guidance to Master/Chief Officer when Loading Grain

By Capt. Kamal Ahmed

I was once hired by my client to get the *approval for loading* by the *Port Warden* in the 2<sup>nd</sup> *loading port* as the actual *healing moment* was more than the permissible *healing moment*. The situation was as follows:

1. The original stow plan which was sent to the shipper by the charterer for loading Port A+ Port B was total for 65,700.00 M/T.
2. Cargo for loading as per shippers request in the beginning was:
  - Lot 1 - minimum /maximum 27 000 M/T for *discharge port A*
  - Lot 2: Minimum 30000 M/T for discharge Port B , Minimum 6600 M/T for *discharge port C*,
  - Total of 63600 M/T
3. In the stowage plan which the *Master* had sent for loading was “64,453.202” M/T. The *Master* mixed Lot 1 & Lot 2 in hold no 7, which cannot be done as lots have to be separated naturally, and not separated artificially. The *Master's* explanation was that the change of the stow is done in order to satisfy the stability requirements as per the port warden at the 1<sup>st</sup> load port. The vessel was not satisfying the shipper’s requirements for natural separations of Lot 1 and Lot 2.

The task consisted of the vessel taking the cargo. As per preliminary stow plan 65 700, Lot 1 and Lot 2 which had to be separated naturally. In the same plan, the vessel had to be stable in the 2<sup>nd</sup> *load port* as well as in the 1<sup>st</sup>, 2<sup>nd</sup> & 3<sup>rd</sup> *discharge port*.

The main challenge was that the vessel had a *draft restriction* of 12.80 M in the first discharge port.

We faced the following problems in preparing the *grain stability form* for the *Port Warden*:

The *grain calculation* has to be carried out with an untrimmed end as the loading with a *trimming machine* (Trimmed End/Grain Stability Booklet) is very expensive.

With arrival *draft* of 12.80 M at the 1<sup>st</sup> discharge port, the bending moment was about 120% with natural separation with cargo 65,700.00 M/T. We tried to minimize the bending moment at less than 99%, but the *draft* was more than 13.4 M at 1<sup>st</sup> port of discharge. The actual healing moment was more than the permissible healing moment.

We tried *our grain stability calculation* with 6500 M/T of Ballast Water in After Peak Tank (100% full), No. 5 DB Tank (Port + Starboard, 100%), No. 4 DB Tank (Port + Starboard, 100%), No. 3 DB Tank (Port + Starboard, 50%), the actual Healing Moment was less then Permissible Healing Moment, Bending Moment was less than 99% but the *draft* was 14.5 M aft. We proposed to the Port Warden that 6500 M/T of Ballast water has to be pumped out at the

*anchorage* at the 1<sup>st</sup> discharge port. The Port Warden agreed as the calculation met all the conditions, with a draft of 12.80 M.

The following were the Stowage Plan

Hold #	HOLD CAPACITY (cum)	STOWAGE (mt)	COMMODITY	Stowage FACTOR (cum/mt)	Port of Discharge	Grade	Percentage %
1	10,620.70	8,511.000	Wheat	1.190	3 <sup>rd</sup> Port + 2 <sup>nd</sup> Port	2	Slack/95.20
2	13,592.80	4,761.000	Wheat	1.190	1 <sup>st</sup> Port	1	Slack/41.66
3	13,278.10	11,108.900	Wheat	1.190	2 <sup>nd</sup> Port	2	Full/100
4	13,248.30	11,137.000	Wheat	1.190	1 <sup>st</sup> Port	1	Full/100
5	13,296.90	11,112.300	Wheat	1.190	2 <sup>nd</sup> Port	2	Full/100
6	13,268.60	11,102.000	Wheat	1.190	1 <sup>st</sup> Port	1	Full/100
7	12,635.80	6,779.000	Wheat	1.190	2 <sup>nd</sup> Port	2	Slack/63.68
		64,511.00					

#### Stability Criteria

Items	Departure Final Loading Port	Arrival C	Required
GM	3.181 M	3.192 M	0.30 M
Max Lever GZ at angle $\geq 30$ degrees	2.079 M	2.130 M	0.20 M
Angle of Max righting Lever GZ	47.56 degree	47.55 degree	25 degree
Area up to 30 degree	0.462 m*rad	0.468 m*rad	0.055 m*rad
Area up to 40 degree	0.790 m*rad	0.803 m*rad	0.090 m*rad
Area between 30 degree to 40 degree	0.328 m*rad	0.336 m*rad	0.030 m*rad
Draft	F: 12.25 M A:14.96 M	F: 12.264 M A:14.741 M	

Sheering Force	3455.28 MT  @ 158.85 m Forward, 58.2% at Sea	3506.64 MT  @ 158.85 m Forward, 59.2% at Sea	-
Bending Moment	-135700 MT-m  @ 92.63 m Forward,  -74.40% at Sea	-139028 MT-m  @ 92.63 m Forward,  -76.20% at Sea	-

In order to load the grain, the *Chief Officer* has to consider the following *points*:

- If the vessel loading up to winter or summer marks
- If the vessel having a draft restriction at loading or discharge port
- If the vessel loading minimum or maximum quantity
- If the actual healing moment were more than the permissible healing, the Chief Officer should consider keeping the smaller holds slack where healing moment for the slack compartments will be less. Also taking Ballast water at loading port may reduce the actual healing moment.

In addition, the Chief Officer needs to ensure to:

- To comply with regulations mentioned in SOLAS CHAPTER VI 1974.
- Always calculate the healing moment with untrimmed ends as the trimmed ends is cost effective.
- That the *Loading Manual* in some vessels provides the *healing moments* in trimmed ends and that there is no indication of Untrimmed Ends. If the forward and after part of the cargo spaces are Hopper type, then the *grain stability* can be done considering "Untrimmed Ends".
- Secure and seal those bulkheads to check if they are made grain tight and remain grain tight during the voyage, for smaller vessel where the forward/aft bulkheads are movable, Reference Bulletin No. SSB 02/2015 issued by "Transport Canada", dated February 24, 2015.
- Pay particular attention to the stowage factor of the grain. If the situation permits, the slack holds are the last holds to complete.
- Refer to Bulletin No. 03/2002 issued by "Transport Canada" regarding "Deviation from the *Load Conditions and Limitations* given in the *Approved Loading Manual*. The vessel's structural integrity has to be always maintained. Block loading refers to

stowage of cargo in a block of two or more adjoining holds - with holds adjacent to such blocks remaining empty. To avoid overstressing the hull structure in the part loaded condition, careful consideration must be given to the amount of cargo in each laden hold and the anticipated sailing draft. The Bending Moment and the Shearing force (Harbor & Sea Condition) in all stages of loading and during the voyage to be within the permissible limits.

- That the loading computer of the vessel has to be “Certified by the Classification Society”.
- That the hold bilge pump & water ingress system has to be in operational condition. This is one of the main requirements of the Port Warden.
- While preparing the Grain Stability Calculation, it is advisable for filled compartment to take maximum trimmed volume and healing moment for untrimmed ends for particular compartment.
- To take “Maximum KG and Free Surface Moment” for compartments filled with liquid.
- While preparing loading sequence the number of Loader with loading rate should be taken into account.

The points mentioned above are pivotal when loading grain and preparing *a grain stability* form so that it gets an *approval for loading* by either the *Port Warden or a NCB/AMSA* surveyor.