



Zenith Maritime LLC

Seattle, Washington USA

USCG License Training

Marine Survey - Consulting

10 May 2009

Mr XXXXXXXXXXXX
XXX Maple Lane
Edmonds, Washington 98026

Re: ZM 09-90XX - Marine Survey of Cumulant 38 Underbody for Condition and Serviceability

Acting on the request of Mr. XXXXXX, the undersigned marine surveyor inspected the underbody and rudder of the SV XXXX when lifted out of the water on 8 May 2009 at the Port of Edmonds Marina, Edmonds, Washington. The purpose of this examination (viz., a thorough visual inspection of the steel hull plating and NDT ultrasonic thickness gauging of the same) was to determine the condition of the vessel's exterior underbody and keel structure. Attending parties were Mr. XXXXX, Mr. David Wilson (marine surveyor) and the undersigned.

The undersigned wishes to disclose that USCG NVIC 7-68 *Inspection of Steel Hull Vessels* was used as guidance in the survey process and report herein.

The services rendered herein and the report furnished herewith are done with the specific understanding that the undersigned is not liable and will not be held responsible under any and all circumstances for any and all errors, omissions, or failure to properly perform the requested services as set forth above. As it concerns the vessel described herein, all matters and statements contained herewith constitute statements of opinion only and not to be construed as representations, warranties, or guarantees and that, any and all statements made herein or in connection herewith will not be used for the basis of any claim, demand, or action against the undersigned. The request for services and the report herewith shall be construed to be an acceptance of the above conditions.

Observations and Non-Standard Conditions

SV XXXX is an auxiliary mast head sloop with deck stepped mast - well constructed of prime materials (mild steel alloy) by Harlingen Yachtbouw, The Netherlands. She carries USCG official hull number XXXX (HIN XXXX), documented to be 38' X 10.5' X 9.6' and endorsed as a recreational vessel. XXXX has taken nearly thirty (30) years of sea service well – and her present condition is reflective of ownership's desire to maintain her in near – if not Bristol condition.

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According to an available data sheet provided by Mr. XXXX, XXXX's hull is welded steel-alloy plating on 1" X 1" – 18" OC frames with a hull plate scantling of approximately 5.0mm (or 0.200" nominal thickness). Research of available literature was conducted by the undersigned to ascertain the specified hull thickness of the Cumulant 38 – but nothing conclusively was discovered – therefore 0.200" was used as the original plate thickness.

The vessel was carefully lifted out of the water and blocked for inspection. The hull was remarkably clean and unfouled. The exterior of the hull was not pressure washed prior to visual and ultrasonic gauging. The topsides are substantially filled and faired which precluded a visual and mechanical examination. Similarly, the weather decks are such that precluded examination as well. Therefore – the vessel was not belt gauged – only the underbody and keel was subject to steel gauging.

No corrosion or damage was observed on the topsides, weather decks and or superstructure. Dissimilar metal corrosion at the mast deck step was observed to be slight, properly controlled and monitored by ownership. No visual evidence of grounding or other damage was observed above or below the waterline. The hull underbody and keel plating is coated with anti-fouling paint generally smooth and fairly uniform in thickness with only minor localized flaking. The keel is rather full – with integral lead ballast down low. Tankage for liquid stores is incorporated into the keel. The water tank was recently reworked as evidenced by a welded in access plate on the portside keel down low. The bronze alloy propeller is well protected in its aperture. The rudder is of steel construction with negligible play in the hinges.

Upon visual examination – the surface of the hull and keel showed no rust blooms, pitting, corrosion, fatigue, structural failure, and or wastage and was fair to the eye with no hard spots or proud plates. Minor inward hull plating buckling was observed below the water line - portside to at the lower underbody and keel at the frame bays. Minor buckling was also observed sporadically starboard side to. Welded plate seams were observed to be in serviceable condition with no visual cracks - fractures or corrosion. Welded in place through-hull penetrations were thoroughly examined – again with no visual evidence of wastage or fatigue. Sacrificial zinc anodes are properly attached to the steel hull plating and at the propeller tail-shaft. The keel shoe was found to be smooth and unabraded. The leading edge of the keel and stem showed no evidence of damage or abrasion.

The steel hull plating was systematically ultrasonically gauged to provide a quantitative basis for evaluating a questionable local and overall condition. In preparation – a TM-8811 portable 5mhz ultrasonic gauging instrument was carefully calibrated just prior to inspection on a known steel plate of 5.0mm or 0.197" (medical grade glycerin was used as an interface agent for all readings).

The underbody of each hull side was prepared for mapping by identifying and referencing a (welded) deck cleat (on each beam) forward of amidships (eventually known as station number 7). An accurately marked fiberglass measuring tape was carefully positioned (slightly down from the bottom of the black boot stripe) longitudinally along each hull side on the unfilled and faired water line section of the hull. The tape was extended forward to near the cut-water aspect of the stem (tape set at the 'zero' foot mark) and then aft to the stern (ending at approximately the '32' foot mark). On both beams, the tape's approximate ten (10) foot mark was visually observed to be vertically aligned with the above mentioned deck cleat and identified as station number 7. Reference stations 1 through 16 were set along the tape at every twenty-four (24) inches fore and aft. From this tape-line - a series of parallel reference lines running down to the so-called

garboard seam at the upper most portion of the keel plate were established on approximately twelve (12) inch centers.

All steel plate measurements were taken with an eight (8) millimeter probe on clean, smooth steel plate hull surfaces at the intersection of the above described horizontal and vertical reference lines (12" X 24"). In the event a reading coincided with an interior transverse framing member – the probe was slightly repositioned. All readings were hand recorded then compared with the original scantling. If wastage - corrosion in the steel plate surface was visually observed outside the pre-determined ultrasonic steel gauging points - it would be considered a justifiable basis for requiring gauging in that affected area. The criteria for such would be deep pitting, holes, fractures, excessively thin edges on structural shapes, bands and or belts of corrosion across hull and keel plating.

Reference to NVIC 7-68 nomograph Table 2-1 "Percentage of Wastage" was made to set the parameters regarding hull plate maximum wastage limits and facilitate evaluation of the results based on a recommended standard of no more than 25% wastage of original thickness. The limits of wastage was determined to be no less than approximately 0.150"

The following are the results of non-destructive ultrasonic gauging on the SV XXX as taken by the undersigned and recorded by Mr. Wilson.

Measurement Profile: Starboard / Port

Note: Reference station number 7 coincides with factory installed cleats on both beams (each open base cleat was independently measured and are nearly the exact same distance from the bow). The most-lower hull plate readings were taken just above the keel plate amidships. Keel plate readings commenced about 6" below garboard seam on an approximate 24" X 18" grid pattern – with the lowest horizontal course above the integral lead ballast. Rudder readings evenly spaced on either side of the blade. Variations in thickness are attributed to anti-fouling coating thickness, etc.. All readings presented in inches.

Hull Underbody - (Readings from top to bottom – set in slightly from edges)

Bow - Station 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Stern - Station 16
STB - 0.208	0.208	0.203	0.208	0.203	0.198	0.198	0.195	0.202	0.193	0.208	0.198	0.193	0.198	0.198	0.198
PT - 0.198	0.208	0.218	0.203	0.203	0.203	0.198	0.203	0.193	0.213	0.208	0.198	0.203	0.198	0.193	0.208
STB - 0.203	0.200	0.203	0.208	0.208	0.193	0.208	0.208	0.218	0.208	0.213	0.208	0.198	0.213	0.198	
PT - 0.193	0.198	0.203	0.212	0.203	0.232	0.198	0.218	0.193	0.213	0.208	0.198	0.203	0.198	0.198	
STB -	0.198	0.210	0.203	0.203	0.210	0.218	0.218	0.208	0.210	0.203	0.193	0.223	0.203		
PT -	0.198	0.203	0.232	0.203	0.233	0.203	0.218	0.223	0.223	0.208	0.198	0.188	0.198		
STB -		0.227	0.203	0.203	0.208	0.210	0.208	0.218	0.198	0.203	0.203				
PT -		0.208	0.191	0.198	0.223	0.200	0.203	0.223	0.197	0.198	0.198				
STB -			0.193	0.198	0.218	0.231	0.203	0.218	0.203	0.213	0.208				
PT -			0.203	0.198	0.212	0.208	0.203	0.198	0.208	0.208	0.203				

Keel - (Readings from top to bottom – set in slightly from edges)

Bow							Stern
STB - 0.193	0.198	0.193	0.198	0.193	0.193	0.188	0.193
PT - 0.213	0.218	0.198	0.193	0.193	0.198	0.203	0.203
STB - 0.203	0.193	0.213	0.193	0.193	0.200	0.205	0.203
PT - 0.205	0.203	0.218	0.208	0.198	0.203	0.208	0.208

Rudder – (Readings from top to bottom – set in slightly from edges)

Forward Surface	After Surface
STB - 0.203	0.198
PT - 0.208	0.218
STB - 0.205	0.205
PT - 0.198	0.198
STB - 0.203	0.205
PT - 0.208	0.198
STB - 0.223	0.203
PT - 0.200	0.198

Addition Hull Readings –

Propeller Aperture Surface Below Screw	0.247
Starboard Thru-Hull Penetrations – Readings taken from surrounding hull plating	Fwd - 0.203, 0.210, 0.218 Amid – 0.208, 0.212 Aft – 0.192, 0.209, 0.205
Port Thru-Hull Penetration - Readings taken from surrounding hull plating	Amid – 0.208, 0.198, 0.198

Findings and Conclusions

Based on the above observations of the exterior of the hull - none of the ultrasonic steel gauging measurements approached the minimum allowable plate thickness. Indicated thickness readings did vary slightly - probably due to normal - expected wastage and differences in the coating of marine anti-fouling bottom paint. The vessel's owner - operator should periodically measure the condition of vessel hull through ultrasonic plate gauging and routine steel maintenance - inspection programs. Steel hulls should be gauged 10 years after initial construction and at five (5) year intervals thereafter. The hull should be thoroughly and carefully examined in the event of collision or grounding. All deep pitting and or buckling should be cause for repair or replacement as found necessary. No inspection of interior hull surfaces, framing members or structures including internal ballast, thru-hull fittings, and or tankage was made by the undersigned.

Recommendations

No material recommendations are made herein or at the time of survey except to maintain proper coating of all metal surfaces with marine grade paints to prevent corrosion and wear. Sacrificial zinc anodes should be changed out when wastage reaches fifty (50) percent. Dissimilar metals in contact with each other should be monitored for corrosion.

Survey Inspection and Report Limitations

The report herein defines and details the condition of the above described vessel at the time of survey to the best of the undersigned's ability by examining and testing the vessel's accessible areas, systems, and accessories by percussion testing, probing, and visual - ultrasonic inspection without taking borings, removing hull fastenings, testing for water leakage inside the hull or at through-hull fittings, or operating machinery. It is the opinion of the undersigned, that her hull steel plating is in satisfactory condition for cruising the inland protected waters of the Pacific Northwest after the above recommendations are complied with and when good seamanship and the ordinary practice of seamen is observed - practiced in the navigation, operation, and maintenance of the vessel described herein.

The survey and report herein is given without prejudice to the questions of rights, interests, and or liabilities on the part of any and all persons concerned.

Respectfully submitted -

John R. Baird

USCG Licensed Master 1035082

Current member of the following professional organizations:

- Society of Accredited Marine Surveyors - Surveyor Associate
- American Boat and Yacht Council (past Hull and Deck Committee Member)



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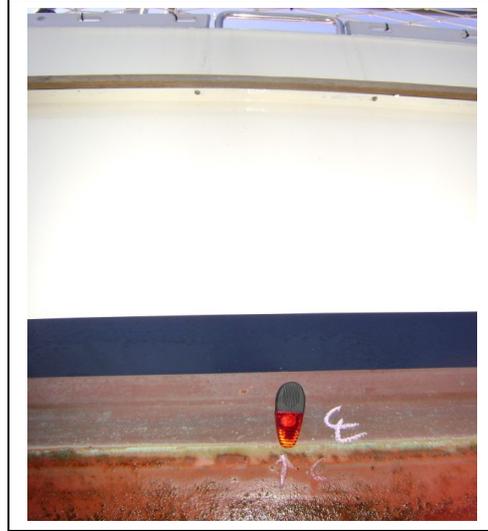
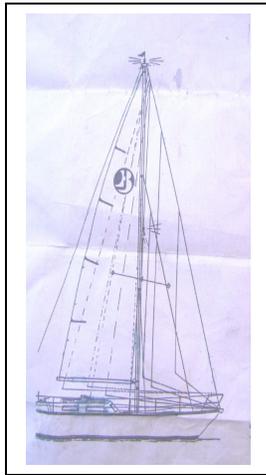
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The mandatory standards as promulgated by the United States Coast Guard (USCG), under the authority of the United States Code (USC); Titles 33 and 46, Code of Federal Regulation (CFR), and the voluntary Standards and Recommended Practices developed by the American Boat and Yacht Council (ABYC) and the National Fire Protection Association (NFPA) have been used as guidelines in the conduct of the survey and report herein.

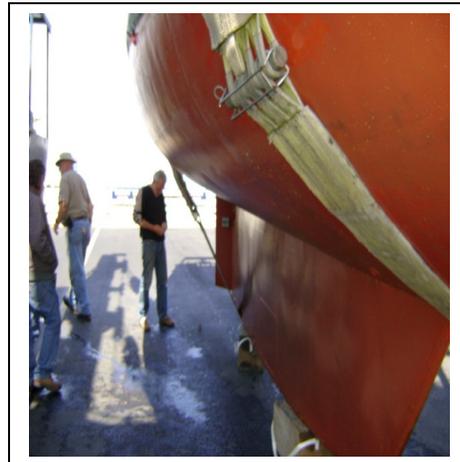
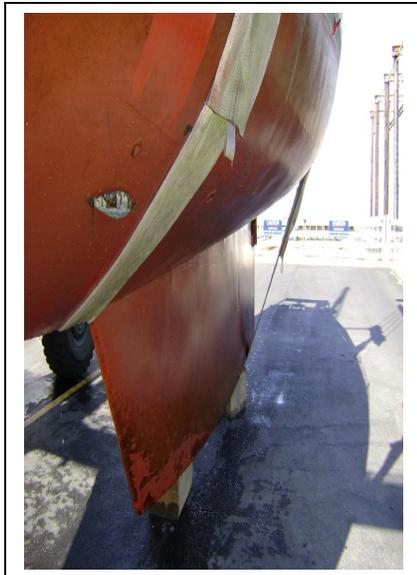
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Side profile of the subject vessel, a Cumulant 38 (left) – Station number 7 referencing deck mounted cleat above red colored clip (right).



Portside hull underbody just after the vessel was hauled – hull surface clean and smooth. Slight inward buckling at the turn of the bilge and at keel (left). Starboard hull was similarly unremarkable (right).



Replaced access plate found lower against the keel shoe on the portside.