GOVERNMENT OF SAMOA

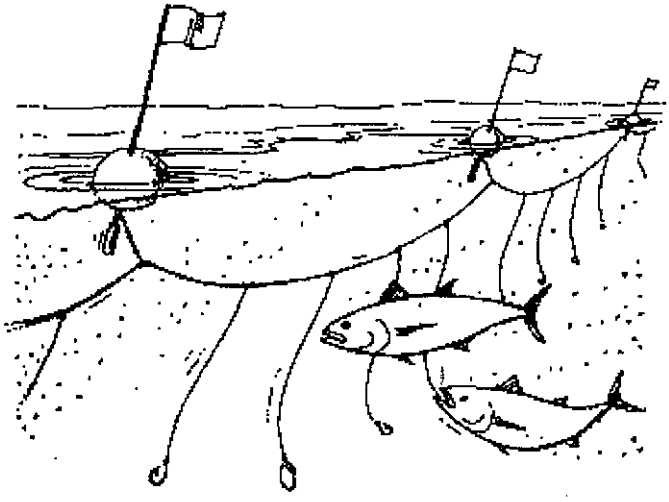
FISHERIES DIVISION
MINISTRY OF AGRICULTURE, FORESTS, FISHERIES
AND METEOROLOGY

SAMOA FISHERIES PROJECT

an **AusAID** - assisted project of the Fisheries Division,
Ministry of Agriculture, Forests, Fisheries & Meteorology.

Procedures and guidelines for the survey of small craft to comply with the Samoan shipping (small vessel) regulations, 1998.

Samoa Fisheries Project, milestone 15, October 1999.



Endorsed on behalf of the Fisheries Division by;

.....
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PROCEDURES AND GUIDELINES FOR THE SURVEY OF SMALL CRAFT TO COMPLY WITH THE SAMOAN SHIPPING (SMALL VESSEL) REGULATIONS 1998

Contents:

1. Application

These procedures will apply to the survey of all craft under 15m overall length that will be engaged in commercial fishing or other purposes in Samoan waters.

Vessels of approved marine aluminium alloys that have been built in compliance with the Ministry of Transport, Shipping (Small Vessels) Regulations 1998 and have been surveyed for compliance by authorised Ministry of Transport Surveys will be certified as seaworthy and complying with the Safety Regulations for the purpose of Registration by the Fisheries Division and will have no "distance from shore" limitation imposed on them by the Surveyors except as provided by Regulation 6 - Safety Equipment, paragraph (2).

Any disputes concerning the implementation of these regulations will be referred to the Samoan Institute of Engineers who will advise the Secretary in writing of their opinion. The Secretary's decision will be regarded as final.

2. Boat Builders

There are certain boat builders that have the potential, and technical experience in building 9m - 15m length aluminium alloy fishing catamarans.

These builders are in a position to influence local standards of boat construction for the safe operation of commercial fishing at sea.

To be recognised, it is recommended that these boatbuilders are granted the endorsement and approval by the Secretary for the Ministry of Transport to construct vessels under the Shipping (Small Vessels) Regulations 1998 Provision 5, paragraphs 1 (2) & (3) and Provision 3 (Licensing of Vessels) paragraph (5).

3. Insurance

By means of the implementation of the Shipping (Small Vessels) Regulations 1998 which the Ministry of Transport Surveyors are authorised to enforce to the minimum standards required of vessels for safety and seaworthiness certification, it is expected that the Insurers will be more selective and confident in underwriting vessels that comply as their standard for risk management in preference to the vessels that engage in fishing without certification and registration.

4. Submission of Plans

Submission of Plans will be required for vessels built after 1 January 2000 as it is assumed that existing vessels will have been built without plans.

(1) Submission of Plans will comply with Provision 5, paragraph (1), (2) & (3) of the Shipping (Small Vessels) Regulations 1998 and are to be submitted in triplicate.

(2) Surveyors will ensure that the plans/specification/drawings will show:

- general arrangement drawings
- the main scantlings
- arrangements, dimensions and details of the principal parts
- grades of aluminium alloys and other materials used for hull plating, frames longitudinals, decks, superstructures and fittings
- volume of hull - measured or calculated
- intended volume of reserve buoyancy
- kg/cm inunersion of vessel in tabular or graph form from light weight of vessel to reserve buoyance free board.
- welding procedures and details of welding
- anticipated loadline
- design draft and displacement for 'bare boat' ie. Without any accessories
- intended fully loaded displacement of vessel
- total hose power of engine
- intended speed of vessel

(3) Plans in triplicate will then be submitted to the Assistant Secretary, Maritime Division, for his approval and stamp. The approved drawings will be identified by a Ministry of Transport identification number in accordance with Provision 5, paragraph (6) of the Shipping (Small Vessels) Regulations.

(4) A file will be opened be the Maritime Division Surveyor marked with the same drawing approval number. A copy of the drawing wil be retained on file as the specification reference for the Surveyor to use for progress inspection of the construction of the vessel.

(5) All the pertaining fees for certification of the vessel will be paid by the boat owner at this stage.

5. Surveyor's Duties Prior to Construction of New Vessels

(1) The builder will be notified by the Assistant Secretary, Maritime Division that his plans have been approved or rejected.

(a) If the plans have been rejected, the Assistant Secretary, Maritime Division that his plans have been approved or rejected.

(b) If the plans have been approved, the notification will containe the following advice:

- That a Ministry of Transport Surveyor will be authorised to inspect the vessel under various stages of construction to verify that building is proceeding in accordance with the drawings and specifications.
- That the builder will accord the Surveyor the necessary facilities in the performance of his duties.
- At no time will the builder place the Surveyor in a position to indemnify himself either by word or action.

(2) The Surveyor will insure that the builders yard is clean and is a safe place to work.

Note: The batch number of the aluminium sheets will be shown in the Mill Certificates and the same number will be stamped on each sheet as a means of identifaction and traceability.

(3) The Surveyor will verify that all materials used in construction are identical to those stated in the specification drawings.

For this purpose the builder will be requested to show invoices, receipts and mill certificates from the manufacturer and seller, the grade and composition of aluminium alloys that he will use in the construction.
See Appendix A for Mechanical properties and Chemical Composition of acceptable aluminium alloys.

(4) **Welding**

(a) The Surveyor will ensure that there is at least one qualified welder from the Polytechnic or other approved source, employed by the builder.
Other welders will need to demonstrate the soundness of their welding by means of prescribed destructive testing of specimen welds performed by them in the presence of the Surveyor.
See Appendix B for description of tests.

(b) The Surveyor will ensure that all welding equipment and accessories are in good working condition and

(c) That the welding wire (consumables) are compatible with the parent aluminium alloys being used in construction and

(d) That provisions are in place to protect the welding process from drafts of wind.

6. Surveyor's Duties during Construction

(1) At various stages of construction, the following dimensions may be checked by the Surveyor and verified against the construction drawings:

- Overall length, beam and depth of centreline of each hull
- Dimensions and arrangement of securing transverse main beams to hull.
- Materials: hardwood or aluminim alloy to be noted. Guidelines and method of securing to hull is given in paragraph 7 (ii).
- Welding may be permitted for securing provided the welding procedure and welding plan are drawn up and the details specified by a qualified and approved welding engineer
- Thickness of shell plating
- Dimensions and thickness of frames
- Number and distance between frames and transverse beams.

(i) Welding will be examined at random by the Surveyor. If in his opinion a welding seam is considered to be defective he may instruct the builder to cut or grind it out and re-weld it. Should his opinion be questioned by the builder, a Local Master Welder from the Polytech will be consulted to examine and test the weld and give a decision.

(ii) The Surveyors will be taught the basic tasks required in inspecting welds of aluminium alloys by the MIG & TIG processes and the methods employed in the examination and testing of welds.

(iii) The Surveyors will be taught the basic tasks required in inspecting welds of aluminium alloys by the MIG & TIG processes and the methods employed in the examination and testing of welds.
The Surveyors will learn to distinguish a good weld from a defective or substandard weld by visual examination alone.(See **Appendix B)**

7. Surveyor's Duties on Completion of Construction:

The following procedures unless otherwise stated in these procedures will apply to new construction and also to existing vessels that are in service to which the basic concepts of watertightness of hulls and weather resistance of the deckcabins will apply.

(1) Allocation of Loadlines

(a) New Vessels -

(i) The Senior Surveyor will verify by measurement that the loadline mark as approved and specified in the drawing has been marked on the outboard side of each hull.

(ii) The loadline will be a horizontal line painted black 200mm x 20mm with the letters **SF** one on each end of the black line.

(b) For existing vessels only -

(i) The Surveyor will note that approximate volume and area of the spaces that are open ie., not closed by decking on the vessel and by observation or measurement:-

If found to be 10% or less of the total volume and area of the vessel, he will mark the loadline a distance of 300mm below the lowest water ingress in the hulls which is in his opinion closes to the distance as prescribed in Provision 5, paragraph (7)(a) and (b) of the Shipping (Small Vessels) Regulations 1998.

(ii) Should the Surveyor consider the space by observation or by measurement to be greater that 10% he will utilize his judgement to apportion the load line between a distance of 300mm and 500mm below the lowest water ingress in the hulls.

(2) Reserve buoyancy to comply with the Shipping (Small Vessels) Regulations 1998 - Provision 5 (4)(a):

(i) Proof of reserve buoyancy will apply to all vessels new and existing, on an annual basis if required, before a valid certificate of seaworthiness will be issued to the owner or boatbuilder.

(ii) The Ministry of Transport will accept an estimate of boat weight (fully loaded displacement) from a recognised boat builder. This estimated weight (fully loaded displacement) will be provided on a signed letter head from the original builder of the vessel, or if the original builder is untraceable another builder.

This certification will be at the owner's expense

(iii) Reserve buoyancy of a vessel may also be calculated or proved by an immersion test.

The Ministry of Transport Surveyor will reserve the right to conduct an immersion test if he is not fully satisfied with the boat builders estimate or calculation of the vessel's weight.

Briefly, it will be proved that:

Because total weight of loaded vessel = total volume of sea water displaced by vessel x 1025kg/m3
::-Total buoyancy > total weight of fully loaded vessel

(a) Immersion Test

- It will be the responsibility of the owner to have his vessel alongside a wharf on a 'bare boat' basis. The venue will be mutually agreed between the surveyor and owner.
- The vessel will have its normal buoyancy spaces filled with anyone or a combination of the buoyancy devices listed below.
    - The vessel will be made fast to the wharf with lines slack.
    - Movable concrete weights will be placed on board to immerse the vessel to its loadline.
    - The void spaces will be flooded with water until the vessel is immersed to its lowest water ingress points.
    - The vessel shall remain afloat without further sinkage for the period of time listed below with the buoyancy device or devices fitted in the vessel's void spaces.

		Minute
Buoyancy chambers filled with polystyrene foam		5
-do-	polyurethane foam	120
-do-	empty sealed plastic bottles	10
-do-	ping pong balls	10
-do-	using watertight bulkheads	20hrs

If in the event of the vessel floating to a lower level at the end of the test period the test period will be extended to 12hrs.

Appendix 'C' - An immersion test on a 28ft alia shows the volume of reserve buoyancy required using polystyrene foam, or empty 600ml plastic bottles with caps or watertight compartments.

(3) Anchoring system complying with Provision 6 (Safety Equipment) paragraph (1) (p) of the Shipping (Small Vessels) Regulations, will apply to all vessels - new and existing.

A bollard which is a short post used on a vessel for securing ropes will be taken by the Ministry of Transport to mean a short post or an equivalent device which is structurally capable of holding a fully loaded vessel to windward by means of a sea anchor or being towed in the event of complete engine failure.

The Surveyor must be satisfied that the construction and the method of securing the short post or equivalent device or vessel's structure intended to be used in a similar manner is structurally sound. If the Surveyor is not so satisfied, he or she will require the boat to be subjected to one of the following tests:

(i) By pulling the vessel in a light and empty condition on rollers up a ramp.
(ii) By towing the vessel in a fully loaded condition in the water.

The first option (I) by pulling -

* The owner or the boatbuilder shall have his vessel at a ramp selected by the Surveyor and agreed by prior arrangement with the owner or ship builder.
* The vessel will be placed in an empty condition onto rollers and then pulled by means of a rope (minimum breaking strength of 1 mt.) which is hitched to a road vehicle at one end and tied to the anchor bollard of the vessel at the other end.

The bollard will be able to withstand being pulled up the ramp on rollers without visible damage to the bollard and its means of attachment to all the structural members.

The second option (ii) by towing -

* The vessel will be towed by its bollard in a fully loaded condition through the water at 6 knots at a distance of at least 100m without visible damage to the bollard and its means of attachment to all the structural members.

(4) Strength of transverse beams:

(i) For existing vessels only:

The materials used for transverse beams on existing vessels are either hard wood or aluminium alloy box section beams. The beams made of hard wood will be found on a few existing 28ft alias- the dimensions are approximately 75mm x 45mm and are attached to the inner hull plating only. On these alias the beams may need to be replaced with new beams of hard wood of the same dimensions as the beams they are replacing except the length will need to be increased for attachments to both sides of the hull - inner and outer. They may also be replaced by aluminium alloy box section beams -

75mm x 40mm x 3mm thick and attached by welding to a frame on both sides of the hull as well as the hull plates.

For Alias which are longer than 28ft, the following guidelines will apply -

* For alias of 12m length the beams will be of aluminium alloy box sections: 100mm x 50mm x 4mm thick;
* The dimensions of beams for alias between 9m and 12m length in aluminium alloy will be between -
  100mm x 50mm x 4mm at the upper hull length ranges and
  75mm x 40mm x 3mm at the lower hull length range

The dimensions of beams of alias longer than 12m and up to 15m length the beams will need to be increased in dimensions accordingly. The exact dimensions will need to be calculated taking the displacement weight of the hulls and the engine horsepower.

(ii) Method of securing transverse beams to hulls-

In the interim period the Surveyors will need to apply the following procedures for accepting/rejecting the method of attachment of beams to the hulls.

* Beams will be attached to both sides of each hull
* Beams will be welded to a frame on both sides of each hull
* The welding of the beams to the hulls will be examined with a magnifying lens for any signs of cracking of the weld and tearing of the metal.

(iii) The method of measuring the loadline displacement weight of the hulls is given in Appendix **'D'** (2 sheets).

8. Survey Procedures during Annual Surveys

* The following survey procedures apply to new vessels prior to granting certificates of safety and seaworthiness and to annual surveys of existing vessels.

  Surveyors will make themselves familiar with all the provisions in the Shipping (Small Vessels) Regulations 1998 which became effective on 29/1/99 and will enforce compliance with all conditions when confident to do so except for the following provisions in which the interpretation is open ended.

Provision 3 (Licensing of Vessel) Paragraph (4)

(a) Applications for registry will contain ALL the particulars contained in the application. The particulars shall be accurate and contain sufficient information to prevent further queries of the owner by the Surveyor.

(b) The vessel complies with all the requirements of the Regulation following a survey.
(c)]
(d)]
(e)] ----- As per Shipping Regulations
(f)]
(g)]

And all provisions following to -

Provision 4 Display of Registration Para (4): Must comply

Provision 5 Construction of Vessels Paras (1) - (4) (a): Must comply
Provision 5 Construction of Vessels Para (4) (b) – [For existing vessels only] The Surveyor will be expected to give his opinion with regard to elements of the vessel's structure being strong enough to sustain sea and weather conditions etc

Provision 5 Para (4)(c):Any other position for steering with outboard engines is considered impractical as with steerage linkage.

Provision 5 Para (4)(d):The cockpit and deck shall have a self draining opening. Applied to all vessel except 28ft alias.

For all vessels	(e):	Opinion of the Surveyor required
For all vessels	(f):	Water tight storage lockers will be tested with a water hose or a bucket of water.
For all vessels	(g):	Must comply, however for existing vessels it is recommended that the following lights be displayed during the hours of darkness. * 1 all round visible fishing light * 1 Port (red light) * 1 Stbd (green light)
For all vessels	(h & k):	Requirement: A Certificate of approval from Department of Labour for Occupational, Safety and Health requirements.
	(i)	This item is covered by Duties of Surveyors on completion of Construction 7(3).
	(j)	This item is covered by Duties of Surveyor on Completion of Construction 7(1)
	(k)	Surveyor's opinion required (For Existing Vessels)

The remaining Provisions will be enforced on all vessels by the Surveyor in liaison with the Police Department and the Fisheries Division.

DESIGNING STRUCTURES IN ALUMINIUM ALLOYS 103

TABLE 1 *Typical physical and mechanical properties of commercially available alloys taken from* The Properties of Aluminium and its Alloys, *Aluminium Federation*

Material designation and temper	Density g/cm2	Coefficient of linear-expansion (10-6/0C)(20-1000C)	0.2% proof stress Mpa	Tensile strength Mpa	Shear strength Mpa	Fatigue strength Mpa (50 x 106Hz)	Modulus of elasticity GPa	Brinell	Hardness Vickers	Rockwell B
5083 0	2.67	24.5	140	312	155	124	69	72	76	-
5083 H22	2.67	24.5	250	337	-	-	69	95	100	52.8
5083 H24	2.67	24.5	285	375	-	-	69	110	116	63.6
5251 0	2.69	24.0	87	180	125	92	70	45	47	-
5251 H22	2.69	24.0	150	220	-	124	70	62	65	-
5251 H24	2.69	24.0	190	250	139	-	70	70	74	-
5454 0	2.69	24.0	100	250	159	-	70	62	65	-
5454 H22	2.69	24.0	200	277	165	-	70	73	77	-
5454 H24	2.69	24.0	225	297	179	-	70	81	85	-
6061 T4	2.70	24.0	125	215	165	95	69	60-70	64-74	-
6061 T6	2.70	24.0	265	305	205	95	69	90-100	95-105	48-56.6
6063 T4	2.70	24.0	90	155	131	79	69	48	50	-
6063 T6	2.70	23.5	180	210	155	85	69	75	79	-
6082 T4	2.70	23.0	130	225	178	106	69	60-70	64-74	-
6082 T6	2.70	23.0	270	310	218	124	69	90-100	95-105	48-56.6
7075 T6	2.80	23.5	495	565	330	-	72	150	-	-

TABLE 35.1

Chemical Composition Limits of Wrought Aluminium Alloys

Limits are in percent maximum unless stated otherwise.

										Others		
Alloy	Silicon	Iron	Silicon and Iron	Copper	Manganese	Magnesium	Chromium	Zinc	Titanium	Each	Total	Aluminium
5052			0.45	0.10	0.10	2.2-2.8	0.15-0.35	0.10		0.05	0.15	Remainder
5083	0.40	0.40		0.10	0.40-1.0	4.0-4.9	0.05-0.25	0.25	0.15	0.05	0.15	Remainder
5086	0.40	0.50		0.10	0.20-0.7	3.5-4.5	0.05-0.25	0.25	0.15	0.05	0.15	Remainder
5454			0.48	0.10	0.50-1.0	2.4-3.0	0.05-0.20	0.25	0.20	0.05	0.15	Remainder
5456			0.40	0.10	0.50-1.0	4.7-5.5	0.05-0.20	0.25	0.20	0.05	0.15	Remainder
061	0.40-0.8	0.7		0.15-0.04	0.15	0.8-1.2	0.40-0.35	0.25	0.15	0.05	0.15	Remainder

TABLE 35.2

Chemical Composition Limits of Cast Aluminium Alloys

ASTM American Society for Testing and Materials
AA Aluminium Association

limits are in percent maximum unless stated otherwise

Alloy									Others		
ASTM	AA	Silicon	Iron	Copper	Manganese	Magnesium	Zinc	Titanium	Each	Total	Aluminium
G70A	356.0	6.5-7.5	0.6	0.25	0.35	0.20-0.40	0.35	0.25	0.05	0.15	Remainder
G70B	A356.0	6.5-7.5	0.20	0.20	0.10	0.20-0.40	0.10	0.20	0.05	0.15	Remainder
	357.0	6.5-7.5	0.15	0.05	0.03	0.45-0.6	0.05	0.20	0.05	0.15	Remainder

TABLE 35.3
Mechanical Property Limits of Non-Heat Treatable Sheet and Plate Aluminium Alloys

Mechanical test specimens are taken as detailed in 35.9.3

Alloy and Temper	Thickness		Ultimate Tensile Strength kg/mm² (ksi)		Minimum Yield Strength 0.2% Offset kg/mm² (ksi)		Minimum Elongation[2] in 50mm (2in.) %
	mm	inches	minimum	maximum	minimum	maximum	
5052-0	3.0-6.5	0.114-0.249	17.6(25.0)	21.8(31.0)	6.7(9.5)		20
	6.6-75.0	0.250-3.000	17.6(25.0)	21.8(31.0)	6.7(9.5)		18
5052-H32	3.0-6.5	0.114-0.249	21.8-(31.0)	26.7(38.0)	16.2(23.0)		9
	6.6-12.5	(0.250-0.499)	21.8(31.0)	26.7 (38.0)	16.2(23.0)		11
	12.6-51.0	(0.500-2.000)	21.8(31.0)	26.7(38.0)	16.2(23.0)		12
5052-H34	3.0-6.5	0.114-0.249	23.9(34.0)	28.8(41.0)	18.3(26.0)		7
	6.6-25.0	0.250-1.000	23.9(34.0)	28.2(41.0)	18.3(26.0)		10
5052-H112	6.5-12.5	0.250-0.499	19.7(28.0)		11.2(16.0)		7
	12.6-51.0	0.500-2.000	17.6(25.0)		6.7(9.5)		12
	51.1-75.0	2.001-3.000	17.6(25.0)		6.7(9.5)		16
5083-0	1.5-38.0	0.051-1.500	28.1(40.0)	35.9(51.0)	12.7(18.0)	20.4(29.0)	16
	38.1-76.5	1.501-3.000	27.4(39.0)	35.2(50.0)	12.0(17.0)	20.4(29.0)	16
5083-H112	6.5-38.0	0.250-1.500	28.1(40.0)		12.7(18.0)		12
	38.1-76.5	1.500-3.000	27.4 (39.0)		12.0(17.0)		12
5083-H116	4.5-38.0	0.063-1.500	30.9(44.0)	39.4(56.0)	21.8(31.0)	30.2(43.0)	12
5083-H117[3]	38.1-76.5	1.501-3.000	28.8(41.0)	39.4(56.0)	20.4(29.0)	30.2(43.0)	12
5083-H323	1.5-3.0	0.051-0.125	31.6(45.0)	38.0(54.0)	23.9(34.0)	30.9(44.0)	8
	3.1-6.5	0.126-0.249	31.6(45.0)	38.0(54.0)	23.9(34.0)	30.9(44.0)	10
5083-H343	1.5-3.0	0.051-0.125	35.2(50.0)	41.5(59.0)	27.4(39.0)	34.4(49.0)	6
	3.1-6.5	0.126-0.249	35.2(50.0)	41.5(59.0	27.4(39.0)	34.4(49.0)	8
5086-0	1.5-6.5	0.051-0.249	24.6(35.0)	30.9(44.0)	9.8(14.0)		18

	6.6-51.0	0.250-2.000	24.6(35.0)	30.9(44.0)	9.8(14.0)		16
5086-H112	4.5-12.5	0.188-0.499	25.3(36.0)		12.7(18.0)		8
	12.6-25.5	0.500-1.000	24.6(35.0)		11.2(16.0)		10
	25.6-51.0	1.001-2.000	24.6(35.0)		9.8(14.0)		14
	51.1-76.5	2.001-3.000	23.9(34.0)		9.8(14.0)		14
5086-H116 and H117[3]	1.5-6.5	0.063-0.249	28.1 (40.0)	33.0(47.0)	19.7(28.0)		8
	6.6-51.0	0.250-2.000	28.1 (40.0)	33.0(47.0)	19.7(28.0)		12
5454-0	3.0-76.5	0.114-3.000	21.8(31.0)	28.8(41.0)	8.4(12.0)		18
5454-H32 [4.5]	1.5-6.5	0.051-0.249	25.3(36.0)	30.9(44.0)	18.3(26.0)		8
	6.6-51.0	0.250-2.000	25.3(36.0)	30.9(44.0)	18.3(26.0)		12
5454-H34[4.5]	4.0-6.5	0.051-0.249	25.3(36.0)	30.9(44.0)	18.3 (69.0)		7
	6.6-51.0	0.250-2.000	25.3(36.0)	30.9(44.0)	18.3(69.0)		10
5454-H112[5]	6.5-12.50	0.250-0.499	22.5(32.0)		12.7(18.0)		8
	12.6-51.0	0.500-2.000	21.8(31.0)		8.4(12.0)		11
	51.1-76.5	2.001-3.000	21.8(31.0)		8.4(12.0)		15
5456-0	1.5-38.0	0. 051-1.500	29.5(42.0)	37.3(53.0)	13.4(19.0)	21.1(30.0)	16
	38.1-76.5	1.501-3.000	28.8(41.0)	36.6(52.0)	12.7(18.0)	21.1(30.0)	16
5456-H112	6.5-38.0	0.250-1.500	29.5(42.0)		13.4(19.0)		12
	38.1-76.5	1.501-3.000	28.8(41.0)		12.7(18.0)		12
5456-H116 and H117[3]	4.5-15.5	0.063-0.624	32.3(46.0)	41.5(59.0)	23.2(33.0)	32.3(46.0)	12
	15.6-32.0	0.625-1.250	32.3(46.0)	39.4(56.0)	23.2(33.0)	31.6(45.0)	12
	32.1-38.0	1.251-1.500	30.9(44.0)	39.4(56.0)	21.8(31.00)	30.2(43.0)	12
	38.1-76.5	1.501-3.000	28.8(41.0)	39.4(56.0)	20.4(29.0)	30.2(43.0)	12

	6.6-51.0	0.250-2.000	24.6(35.0)	30.9(44.0)	9.8(14.0)		16
5086-H112	4.5-12.5	0.188-0.499	25.3(36.0)		12.7(18.0)		8
	12.6-25.5	0.500-1.000	24.6(35.0)		11.2(16.0)		10
	25.6-51.0	1.001-2.000	24.6(35.0)		9.8(14.0)		14
	51.1-76.5	2.001-3.000	23.9(34.0)		9.8(14.0)		14
5086-H116 and H117[3]	1.5-6.5	0.063-0.249	28.1 (40.0)	33.0(47.0)	19.7(28.0)		8
	6.6-51.0	0.250-2.000	28.1 (40.0)	33.0(47.0)	19.7(28.0)		12
5454-0	3.0-76.5	0.114-3.000	21.8(31.0)	28.8(41.0)	8.4(12.0)		18
5454-H32 [4.5]	1.5-6.5	0.051-0.249	25.3(36.0)	30.9(44.0)	18.3(26.0)		8
	6.6-51.0	0.250-2.000	25.3(36.0)	30.9(44.0)	18.3(26.0)		12
5454-H34[4.5]	4.0-6.5	0.051-0.249	25.3(36.0)	30.9(44.0)	18.3 (69.0)		7
	6.6-51.0	0.250-2.000	25.3(36.0)	30.9(44.0)	18.3(69.0)		10
5454-H112[5]	6.5-12.50	0.250-0.499	22.5(32.0)		12.7(18.0)		8
	12.6-51.0	0.500-2.000	21.8(31.0)		8.4(12.0)		11
	51.1-76.5	2.001-3.000	21.8(31.0)		8.4(12.0)		15
5456-0	1.5-38.0	0. 051-1.500	29.5(42.0)	37.3(53.0)	13.4(19.0)	21.1(30.0)	16
	38.1-76.5	1.501-3.000	28.8(41.0)	36.6(52.0)	12.7(18.0)	21.1(30.0)	16
5456-H112	6.5-38.0	0.250-1.500	29.5(42.0)		13.4(19.0)		12
	38.1-76.5	1.501-3.000	28.8(41.0)		12.7(18.0)		12
5456-H116 and H117[3]	4.5-15.5	0.063-0.624	32.3(46.0)	41.5(59.0)	23.2(33.0)	32.3(46.0)	12
	15.6-32.0	0.625-1.250	32.3(46.0)	39.4(56.0)	23.2(33.0)	31.6(45.0)	12
	32.1-38.0	1.251-1.500	30.9(44.0)	39.4(56.0)	21.8(31.00)	30.2(43.0)	12
	38.1-76.5	1.501-3.000	28.8(41.0)	39.4(56.0)	20.4(29.0)	30.2(43.0)	12

Appendix 'B'

Inspection and Testing of Welds:
Inspection and testing of welded joints in boat construction is necessary to obtain and maintain the required joint quality in welding.

Visual examination of welds:
Non uniform welds should be looked at with suspicion.

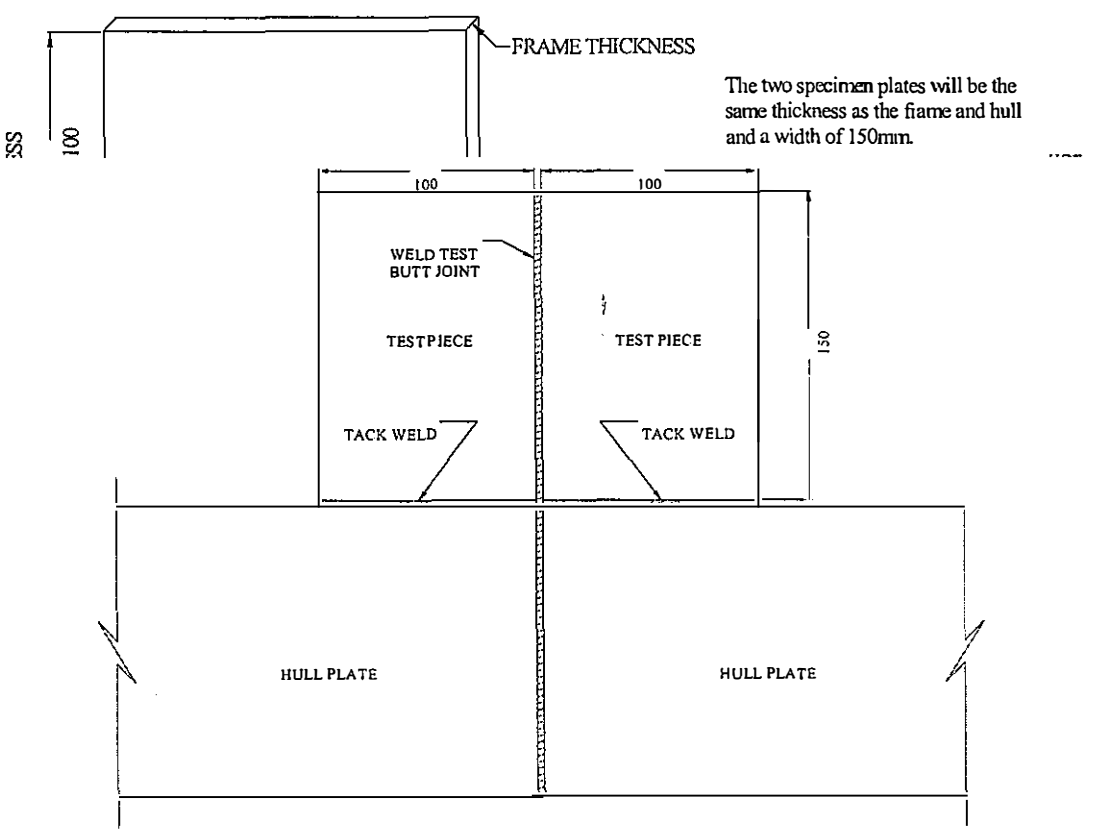
Examination with a magnifying lens will readily indicate such defects as lack of penetration on welds made from one side, surface cracks, undercut and overhand.

Two other methods of examining welds are known also as 'non-destructive' testing ie., Dye penetrant and radiography. Both are expensive, unnecessary and impractical for testing welds in small craft construction.

Destructive Testing:
This type of testing can be carried out by the Surveyor at the boat builders yard to qualify a welder who is unable to prove his competence in welding by certificate or by experience.

* The welding of the test piece or specimen must be performed in the presence of the Surveyor
* The welder will be given an identity number by the Surveyor
* The boat builder will be instructed to prepare the specimen
* The welders number will then be stamped on the specimen

Fillet Welds:



The test piece is then secured in a vice with the weld uppermost. The upright plate is then forced over either by an adjustable spanner or hammer. A good weld should bend almost flat before breaking. Lack of fusion will be clearly shown.

The welder will be tested on a "run-off" test specimen of the hull butt weld joint as shown in the sketch.

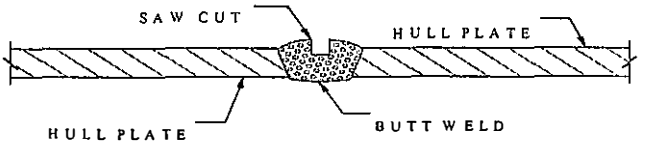
* The dimensions of the two plates to be test-welded will be 100mm x 150mm x thickness of hull plating
* The plates will be stamped with the ID number of the welder.
* The two plates of the test piece will be tack-welded to the hull plates at a distance which is the same as the hull plate joint roof width, as if they were an extension or 'run-off' of the 2 hull plates to be welded.

* The welder will continue the butt weld he is performing on the hull butt joint to the test piece without stopping the welding run which will be performed in the presence of the Surveyor
* The test piece will be cleaned of weld bead and reinforcement and bent through 180° around a radius equal to four times the thickness of the material without fracture.

Butt Weld-Nick break: Should the above butt weld bend test fail, the nick break weld test may be prescribed as follows:

* Using another specimen of the same dimensions as the Butt Weld bend test and the similar procedure, the weld is left as it is and notched with a saw cut, placed in a vice and the free end hammered very sharply until the weld is fractured. Examination will reveal such defects as porosity, inclusions, lack of penetration, lack of fusion and under bead cracking.

Appendix C



Measurement of hull displacement by approximation.

1) Vessel will be placed on rollers on level dry ground

2) Plyboards of 2.4m x 0.6m made up to 15m in total length and marked at 1m intervals by black or white lines will be placed adjacent to one hull keel.

3) The load line will be marked on both hulls as prescribed.

4) The load line will be transferred at the same level on one hull at one metre intervals corresponding to the lines on the plyboards (station) by means of a plastic 10mm tube water level gauge and a plumb line along the complete length of the hull.

5) The distance between the load line and the chine will be recorded at each station (at 1m intervals corresponding to the lines on the plyboards).

6) The distance between the chine and the plyboard will be recorded at each station.

7) The distance between the keel and the plyboard will be recorded at each station.

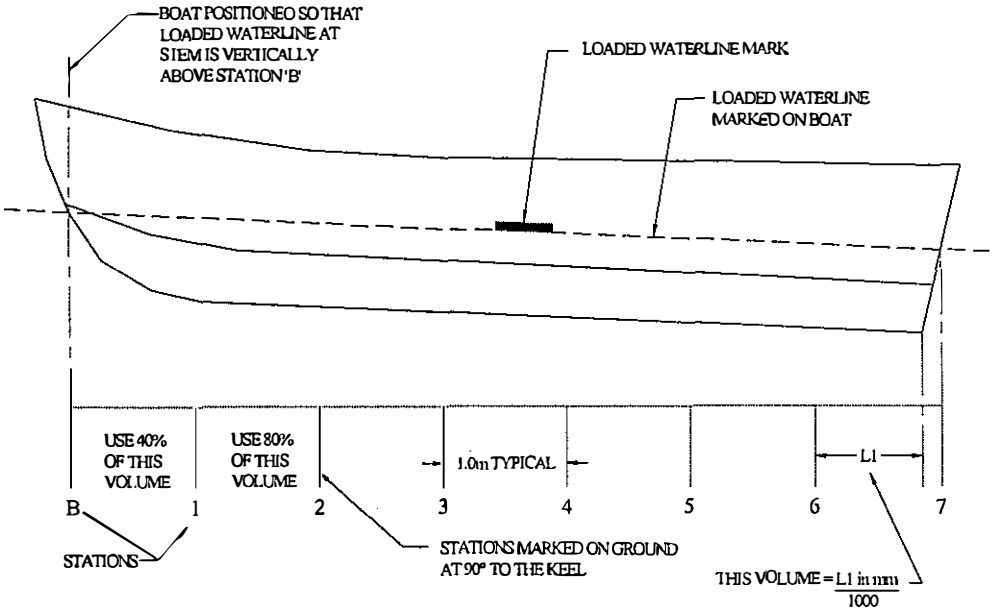
8) The distances from chine to keel at each station will be:
   - Distances recorded at 6 less distance recorded at 7
   - The differences between 6 and 7 will be recorded

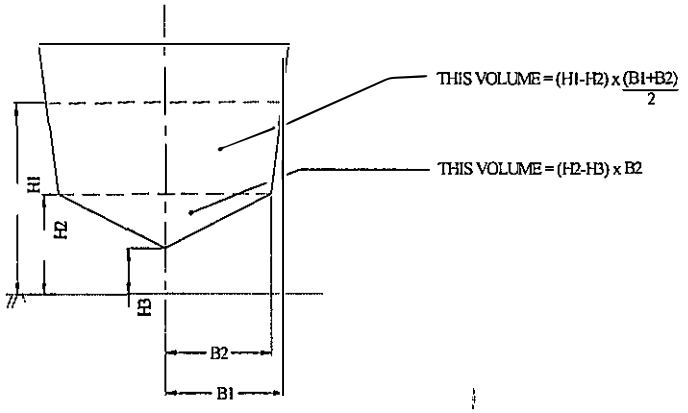
9) The half beam lengths at each station will be recorded.

10) The resulting areas of these readings will be:
The figures obtained at item 5 x ½ beam measurements at each station x 2 plus the figures obtained at item 8 x ½ beam measurement at each station x a block co-efficient at the forward end (where the hull tapers).

11) The volume of displacement in decimeters will be item 10 x length of hull x 2 (for the vessel).
12) Displacement weight of the vessel = item 11 x 64.5
62.0

MEASURING ALIAS FOR LOADED DISPLACEMENT





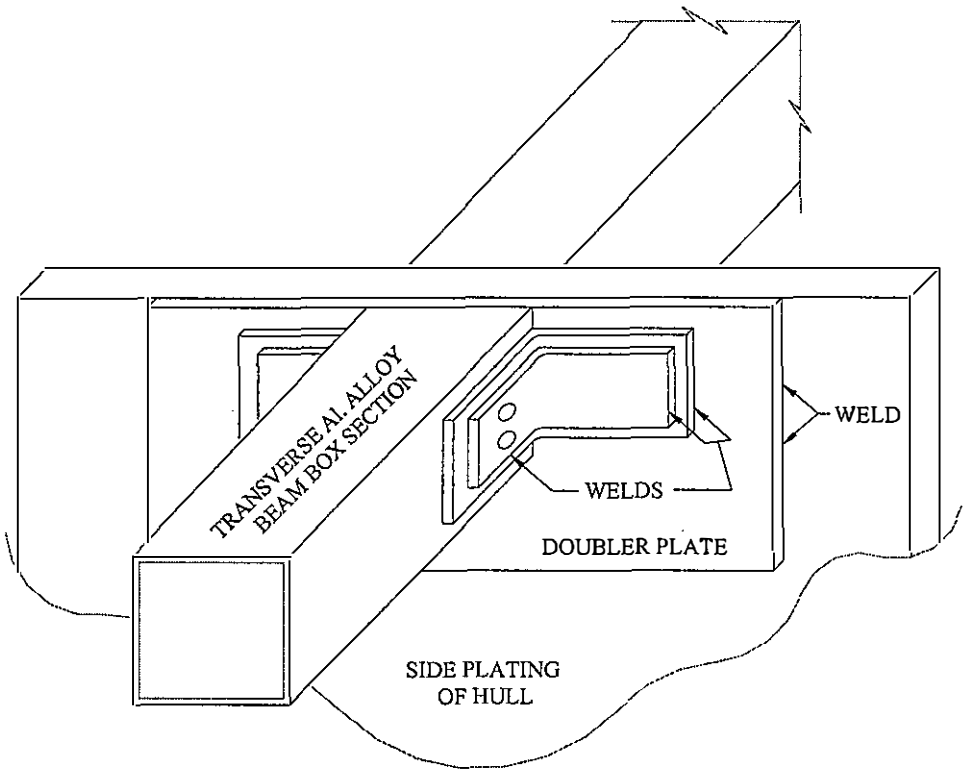
CALCULATIONS OF DISPLACEMENT OF FULLY LOADED BOAT

STATION						
B→1	(H1-H2) x (B1+B2)/2		x	40%	=	.....
1→2	"		x	80%	=	.....
2→3	"	"	x	100%	=	.....
3→4	"	"	x	100%	=	.....
4→5	"	"	x	100%	=	.....
5→6	"	"	x	100%	=	.....
6→7	"	"	x	L1 (in mm)/1000	=	.....

TOTAL DISPLACMENT OF ONE HULL = ...

TOTAL DISPLACMENT BOAT (x2) = ...

SUGGESTED METHOD OF ATTACHMENT OF TRANSVERSE BEAM TO HULLS - DETAILS TO BE SHOWN BY ENGINEER.



APPENDIX 'C'

IMMERSION TEST TO PROVE THE VOLUME OF RESERVE BUOYANCY REQUIRED TO KEEP A 28ft (7.56m) ALIA AFLOAT

Flotation experiment conducted on 28 August 1999 at Matautu Beach.

Boat Owner	:	AFANO
Boat Builder	:	Kim Levy
Fisheries Consultant	:	Peter Watt
MOT Marine Surveyor	:	Jack Oswald

The alia pontoons were stuffed with polystyrene blocks each measuring 1200mm x 170mm x 180mm.

The two spaces as shown in the sketch of the pontoon below were initially fitted and filled to three quarter height of pontoon with polystyrene foam which was measured at $0.2m^3$

The alia was then filled with water until the free board was zero. The exact point of submersion was determined by removing sufficient blocks to stabilize the vessel at zero freeboard with 3 persons on board.

Three persons were taken as equivalent to two engines with fuel. The water was then emptied from the vessel and the quantity of blocks that were put into the alia was counted and measured.

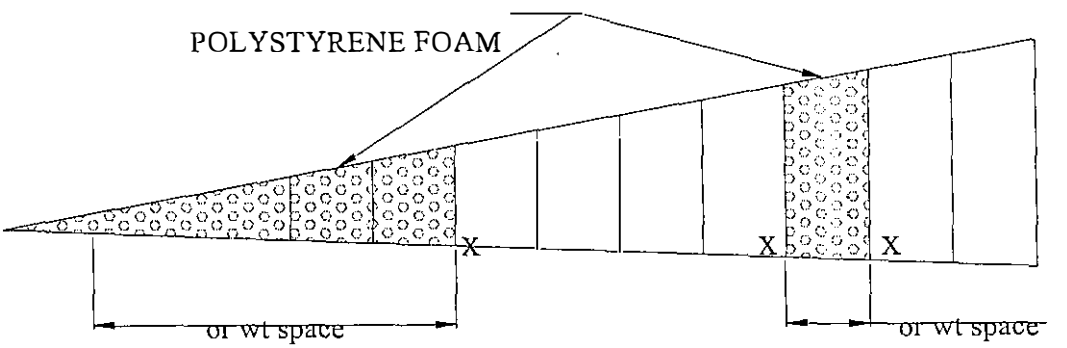
Findings: 17nos x 1200 x 170 x 180mm blocks or $0.624m^3$ - polystyrene foam blocks required for 1/3 length of each pontoon.
0.624)
0.2) polystyrene foam
0.2) initially fitted in alia

Total 1.024m3
or rounded off to $1.00m^3$ volume of reserve buoyancy required to keep 28ft alia afloat.

OR:
Number of 600m litre empty plastic bottles required to fill $1.00m^3$ volume.
1 x 600m litre bottle will support $\frac{1 \times 0.6m3}{1000}$

Therefore $1.00m^3$ will be supported by $\frac{1.00}{.0006}$ = 1666 bottles
Now 800 x 600ml bottles will stow in $1.26m^3$ volume.
Therefore 1666 bottles will stow in $2.5m^3$ volume.
Or one 28ft alia will require $2.5m^3$ volume space to stow 1666 empty 600ml bottle.

I
v



Where wt = water tight

If deciding on buoyancy chambers without polystyrene foam, at the bulkheads marked x must be watertight and lead up to a watertight deck.