China Classification Society

Guidelines for Survey of Marine Hanging Basket

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CONTENTS

Chapter 1 GENERAL

Section 1 GENERAL PROVISION

1.1.1 Objective

1.1.1.1 The Guidelines specify the technical requirements for plan approval and survey of manned shuttle baskets, manned working baskets and cargo hanging baskets for offshore installations in terms of structural configuration and safe working loads, so as to guide the plan approval and survey of manned hanging baskets and cargo hanging baskets for offshore installations.

1.1.2 Scope

1.1.2.1 The Guidelines are applicable to the manned shuttle baskets, the manned working baskets and the cargo hanging baskets on hoisting machinery of offshore installations.

Section 2 NORMATIVE REFERENCES

1.2.1 General requirements

1.2.1.1 The design, construction and installation of the manned shuttle baskets, manned working baskets and cargo hanging baskets for offshore installations shall meet the requirements of the relevant laws and regulations of competent authorities, the national and industrial standards and the CCS specifications. Generally, the following specifications and standards are referred to (for the undated documents, the latest version shall prevail):

(1) *Rules for Materials and Welding* by CCS

(2) *Rules for Lifting Appliances of Ships and Offshore Installations* by CCS

(3) *Rules for Construction and Survey of Offshore Fixed Platform* by CCS

(4) *Safety Nets* (GB 5725)

(5) *Aluminium-alloy Swaged Ferrules for Steel Wire Rope* (GB/T 6946)

(6) *Steel Wire Ropes* (GB/T 8918)

(7) *Steel Wire Ropes for General Purpose* (GB/T 20118)

(8) *Specification for the Operation of the Hanging Ring Used in the Port for Cargo Handling* (GB/T 14736)

(9) *Specification for the Operation of Sling Used in the Port for Cargo Handling* (GB/T 14737)

(10) *Fibre Ropes—General Specification* (GB/T 21328)

(11) *Temporarily Installed Suspended Access Equipment* (GB/T 19155)

(12) *Rope Thimbles* (CB/T 33)

(13) *Polyamide Ropes* (SC/T 5011)

(14) *Shackles for Ship* (CB/T32)

Section 3 DEFINITIONS

1.3.1 Definitions in the Guidelines

(1) Offshore installation

Offshore installations include the offshore fixed platforms, single-point mooring facilities, floating production, storage and offloading (FPSO) units, offshore mobile units, offshore aquaculture facilities, offshore wind power generation facilities and offshore tourism facilities.

(2) Manned hanging basket

Manned hanging basket refers to a special lifting tool used to lift personnel on offshore installations, which can be classified into the manned shuttle basket and the manned working basket.

(3) Manned shuttle basket

Manned shuttle basket refers to the special lifting tool used on offshore installations to lift and transfer personnel and their accompanying articles. Such basket is classified into column type manned hanging baskets, column-free manned hanging baskets and frame type manned hanging baskets. The column type hanging basket is provided with a column at the center, and the top and bottom of the column are connected by a rope net. The top and bottom of the column-free hanging basket are also connected by a rope net without any column, while the frame type hanging basket consists of a main frame structure, a buoyancy device, a seat and the like.

(4) Manned working basket

Special slings used in the offshore installations to lift personnel to complete the construction operations in hanging baskets, which are generally steel frame hanging baskets.

(5) Cargo hanging baskets

The special slings used to lift goods on the offshore installations.

(6) Fiber rope sling

The fiber rope sling is used for loading/unloading, which is composed of one or both ends of the fiber rope connected with metal fittings such as hooks and rings. Fiber ropes can also be made into slings separately.

(7) Wire rope sling

The wire rope sling is the loading/unloading sling consisting of one or both ends of the wire rope connected with metal fittings such as hooks, rings and chains. Wire ropes can also be made into slings separately. The wire rope sling can be classified into single-limb slings and multi-limb slings. The most common type is a single-limb wire rope sling with two ends of the wire rope made of aluminum alloy or steel joints.

(8) Eyelet

The annular loop made by inserting strands at both ends of the rope, also known as soft loop eye. If the eyelet is embedded with metal, it is called a hard eyelet.

(9) Shackle

The connecting tool used in lifting operation.

(10) Hanging rings

The combined parts of slings are classified into the main ring and the connecting ring. The main ring is connected with the lifting tool on the lifting machine.

(11) Safety net

The net used to prevent people and things from falling, or to avoid or reduce the damage caused by falling and object impact. A safety net generally consists of the net body, a side rope and a tether.

(12) Safe working load of manned hanging basket (SWL)

The maximum static load with which the manned hanging basket is allowed to be lifted under the vertical load.

Chapter 2 SURVEY REQUIREMENT

Section 1 PLANS AND DOCUMENTS

2.1.1 Approval of plans and documents

2.1.1.1 The applicant shall submit the following plans and documents to China Classification Society (hereinafter referred to as CCS) for approval before commencement of construction. If necessary, the scope of plans and documents to be submitted can be expanded.

(1) General technical specification;

(2) Component materials and manufacturing specifications;

(3) General arrangement;

(4) Basic structural plan

(5) Main structural joint diagram

(6) Strength calculations for structure

(7) Strength calculations for lifting points

(8) Buoyancy calculations (if applicable);

(9) Diagram of nameplates;

(10) Welding procedure or procedure qualification document;

(11) Technical requirements for nondestructive testing;

(12) Test procedures, etc.

Section 2 TYPES OF SURVEYS

2.2.1 Types of surveys

2.2.1.1 Manufacturing survey

The survey carried out by the Surveyor in the course of construction according to the approved plans.

2.2.1.2 Other surveys

Other surveys of hanging baskets shall be carried out in accordance with the relevant requirements of the certification and survey institutions of offshore installations.

Section 3 SURVEY REQUIREMENTS

2.3.1 Manufacturing survey

2.3.1.1 Manufacturing survey includes the survey during manufacturing and the survey and test before delivery. The Surveyor shall manufacture and/or conduct ex-factory survey of the hanging baskets and components according to applicable standards, approved plans and review opinions. The specific contents are as follows:

(1) Validation of materials and parts: validate the certificates or relevant supporting documents of materials and parts;

(2) Examination of personnel and equipment qualification: check the qualifications of welding and NDT personnel and the effectiveness of test equipment;

(3) Confirmation of the manufacturer's quality control plan and the approved welding process;

(4) Welding quality inspection: check the welding quality of main structures and lifting points;

(5) Overall appearance inspection: appearance inspection, assembly quality survey and size survey. The metal parts shall be free from cracks, overheating, scars, wrinkles, mechanical scratches, depressions and other defects that are detrimental to strength and appearance. The weld edge shall be smoothly transferred to the parent metal. The dimensions of the whole product, components and accessories shall meet the requirements of design plans;

(6) Test: The hanging basket shall be tested according to the requirements in Chapter 4 of the Guidelines. After the verification test, no residual deformation, cracks or other defects are allowed in the load-bearing components such as hanging baskets, sling, hang rings and load-bearing ropes;

(7) Non-destructive testing: Before the static overload test, the welds (including the lifting points) of the main load-bearing structure shall be subjected to the magnetic particle or dye penetrant inspection and ultrasonic flaw detection (if applicable) by an NDT organization accepted by CCS. Besides, surface flaw detection shall be carried out after static overload test;

(8) Buoyancy test: buoyancy test shall be carried out for the hanging baskets with buoyancy requirements, and the test results shall meet the relevant standards of hanging baskets or the owner's technical requirements, whichever are higher;

(9) Review of completion data: A complete set of completion data of products shall be provided, which shall be comprehensive and complete.

Chapter 3 TECHNICAL REQUIREMENTS

Section 1 GENERAL PROVISION

3.1.1 General requirements

(1) The basket shall work normally at ambient temperature of -20℃ to +40℃.

(2) The structural configuration and material of the manned hanging basket shall be suitable for the environmental conditions. Any slings with novel forms and materials to be adopted shall be approved by CCS.

(3) The structure of the manned hanging basket shall ensure the safe embarkation of people. If doors are arranged on the passage, locking devices shall be provided.

(4) The manned hanging basket shall be painted with striking colors.

(5) The manned hanging basket shall provide adequate space for passengers, and the bottom surface of the hanging basket shall be provided with anti-skid measures.

(6) The manned hanging basket shall be equipped with facilities to ensure the safety of personnel and belongings, such as safety nets and safety handles.

(7) The manned hanging basket shall be provided with an anchor point to fix the safety net.

(8) The personnel accounting weight is at least 122.5 kg per person, including 82.5 kg of personnel weight and 40 kg of the extra carry-on weight.

(9) The manned shuttle basket shall be guaranteed with sufficient buoyancy, and the column type manned hanging basket and the non-column type manned hanging basket shall not sink under no load, and the frame type manned hanging basket shall not sink or overturn under the rated carrying number of passengers. Buoyancy shall be verified in buoyancy calculation.

(10) In order to prevent the lifting hook from hurting people in the hanging basket, slings with sufficient lengths shall be used.

(11) The hanging basket shall be provided with a traction rope, which is convenient for auxiliary personnel to assist in traction.

(12) The manned hanging basket shall be permanently marked with the manufacturer's name, model & specification, product number, manufacturing date, safe working load, the rated quasi-carrying capacity and safety warning. The self-weight, use conditions and scrapping conditions shall also be indicated in the instruction manual.

(13) The cargo hanging basket shall be marked with the manufacturer's name, product name, product number, dimensions and specifications, self-weight, rated load, name of survey organization, production date, etc.

(14) Slings can be classified into single-limb slings and multi-limb slings (composed of two or more single-limb slings) according to the assembly type.

(15) The selected end accessories must match the working load of the sling.

(16) Metal components can be welded and manufactured with high-quality carbon steel or other equivalent metal materials. The load-bearing metal components are not allowed to be connected by screws, and the rated load of the metal components shall not be less than that of the sling.

(17) The influence of concentrated load shall be considered to ensure the strength and stiffness of the bottom structure.

(18) After the manned hanging basket is connected with the hook, an extra set of safety rope shall be set to firmly connect the manned hanging basket with the hook.

3.1.2 Safety factor

(1) The safety factor of the steel wire rope, harness, chain, shackle, hanging ring and lifting hook of the manned hanging basket shall not be less than 10. The safety factor of the steel wire rope, harness, chain and other aspects of the cargo hanging basket shall not be less than 6. The safety factor of the shackle, hanging ring and lifting hook shall meet the requirements of relevant specifications and standards, and shall not be less than 3.

(2) The static safety factor of the strength of the main steel structure strength shall meet the requirements of relevant specifications and standards, which shall be no less than 10 for the manned hanging baskets and no less than 3 for the cargo hanging basket.

(3) The safety factor for the design and strength calculation of lifting point structure shall meet the requirements of relevant specifications and standards, which shall be no less than 10 for the manned hanging basket and no less than 5 for the cargo hanging basket.

(4) The safety factor of fiber ropes shall not be less than n, which shall be calculated from the following formula:

$$n = 72/D + 3$$

where, n is the safety factor;

D is the rope diameter in millimeters.

(5) The safety factor of hanging baskets and sling with the steel wire rope core and the fiber cover shall be selected according to the steel wire rope.

3.1.3 Wire rope sling

(1) The wire rope slings shall meet the requirements of GB/T8918 standard and the technical requirements of GB/T14737.

(2) The pressed joint shall be adopted for the wire rope, and aluminum alloy pressed joints shall meet the relevant provisions of GB/T6946.

(3) The included angle between limbs of wire rope slings shall not be greater than 120°.

(4) The rated load and ultimate working load of the wire rope sling shall meet the requirements of GB/T14737.

3.1.4 Fiber rope sling

(1) The fiber rope slings shall be selected according to the relevant regulations of fiber ropes in GB/T21328 and the technical requirements of GB/T14737.

(2) The inner circumference of the soft eyelet of the fiber rope sling shall not be less than the value in Table 3.1.4.

Inner Circumference of Soft Eyelet of Fiber Rope Sling **Table 3.1.4**

Nominal diameter of rope (mm)	**Inner circumference of rope eyelet mm**	**Nominal diameter of rope mm**	**Inner circumference of rope eyelet mm**

16	150	32	195
18	155	36	210
20	160	40	220
24	170	44	232
28	185	48	245

(3) The inner circumference of the hard eyelet of the fiber rope sling shall match the size of the fiber rope lasso specified in GB/T33.

(4) The diameter of the connecting part between the end fittings and the eyelet of the sling shall not be less than the diameter of the rope.

(5) Ropes and strands shall be continuous, free of joints.

3.1.5 Safety net

(1) The net rope, side rope, tether and tendon rope used on the net shall be made of at least 3 strands of single ropes. The rope head shall be braided and scalded to avoid looseness.

(2) All joints on the net shall be fixed.

(3) The shape of the mesh shall be rhombic or square, and the side length of the mesh shall not be greater than 8 cm.

(4) The height of the vertical net shall not be less than 1.2 m.

(5) Safety net shall be flaming retardant and seawater corrosion resistant.

(6) The breaking strength of safety net ropes shall meet the requirements in Table 3.1.5(1).

Requirements for Breaking Strength of Flat (Vertical) Net Rope

Table 3.1.5 (1)

Net type	**Rope type**	**Requirements of rope breaking strength N**
Flat safety net	Side rope	≥7,000
	Net rope	≥3,000
	Tendon rope	≤3,000
Vertical safe net	Side rope	≥3,000
	Net rope	≥2,000
	Tendon rope	≤3,000

(7) The impact performance requirements of safety nets shall meet the requirements in Table 3.1.5-2 below.

Impact Resistance Requirements of Flat (Vertical) Nets Table 3.1.5 (2)

Safety net type	**Flat**	**Vertical**
Impact height	7 m	2 m
Test result	The net rope, side rope and tether shall not be broken, and the test weights shall not touch the ground.	The net rope, side rope and tether shall not be broken, and the test weights shall not touch the ground.

3.1.6 Hanging ring

(1) Hanging rings shall meet the relevant provisions in GB/T14736.

(2) The sizes of hanging ring shall be determined based on the nominal diameter of the rope connected to the hanging ring.

(3) The hanging rings shall be made of killed steel with good weldability, and the maximum contents of sulfur and phosphorus in the material shall not exceed the requirements in Table 3.1.6 (1) below.

List of Hanging Ring Materials Table 3.16 (1)

Strength grade	Sulfur (maximum content)		Phosphorus (maximum content)	
	Ladle analysis	Survey analysis	Ladle analysis	Survey analysis
Grade M (4)	0.040%	0.050%	0.040%	0.045%
Grades S (6) and T (8)	0.035%	0.040%	0.035%	0.040%

(4) The strength grade of hanging rings shall meet the requirements in Table 3.1.6 (2) below.

Hanging Ring Strength Grades (MPa) Table 3.1.6 (2)

Strength grade	Average stress under the action of minimum breaking force	Average stress under verification	Average stress under rated working load
Grade M (4)	400	200	100
Grade S (6)	630	315	157.5
Grade T (8)	800	400	200
Note: The average stress is equal to the force on the hanging ring divided by the total cross-sectional area on both sides of the hanging ring.			

3.1.7 Shackle

(1) Shackles shall meet the relevant requirements in GB/T32.

(2) Shackles must be forged as a whole. The cross pin shall be forged or machined with round steel.

(3) The shackle shall be subjected to a tensile test of 2 times the allowable load for no less than 5 minutes.

(4) The end of the shackle cross pin shall be threaded, and the cross pin shall generally be equipped with a device to prevent loosening. The shackle used to connect the parts of the sling system shall be equipped with a semi-countersunk cross pin.

3.1.8 Lifting point

(1) The lifting point material shall be consistent with the main structure material, and the strength shall be checked.

(2) 100% NDT shall be carried out for the welds of the lifting points. For specific requirements, please refer to 2.3.1 (7) of the Guidelines.

(3) The hanging basket shall be designed with the main and auxiliary lifting points, which should be capable of bearing the same load.

Section 2 COLUMN TYPE MANNED HANGING BASKET

3.2.1 General requirement

3.2.1.1 The safe nets shall conform to the provisions of 3.1.5 of the Guidelines.

3.2.1.2 The column of the column type hanging basket shall be of steel structure. Other materials to be adopted shall be approved by CCS.

3.2.1.3 The bottom material of the hanging basket shall have certain buoyancy, buffering capability and resistance to seawater corrosion.

3.2.1.4 The general structural configuration of column type manned hanging basket is shown in 3.2.1.4.

3.2.1.5 The welds of lifting points and main load-bearing structures shall be subjected to 100% NDT. For specific requirements, please refer to the 2.3.1 (7) of the Guidelines.

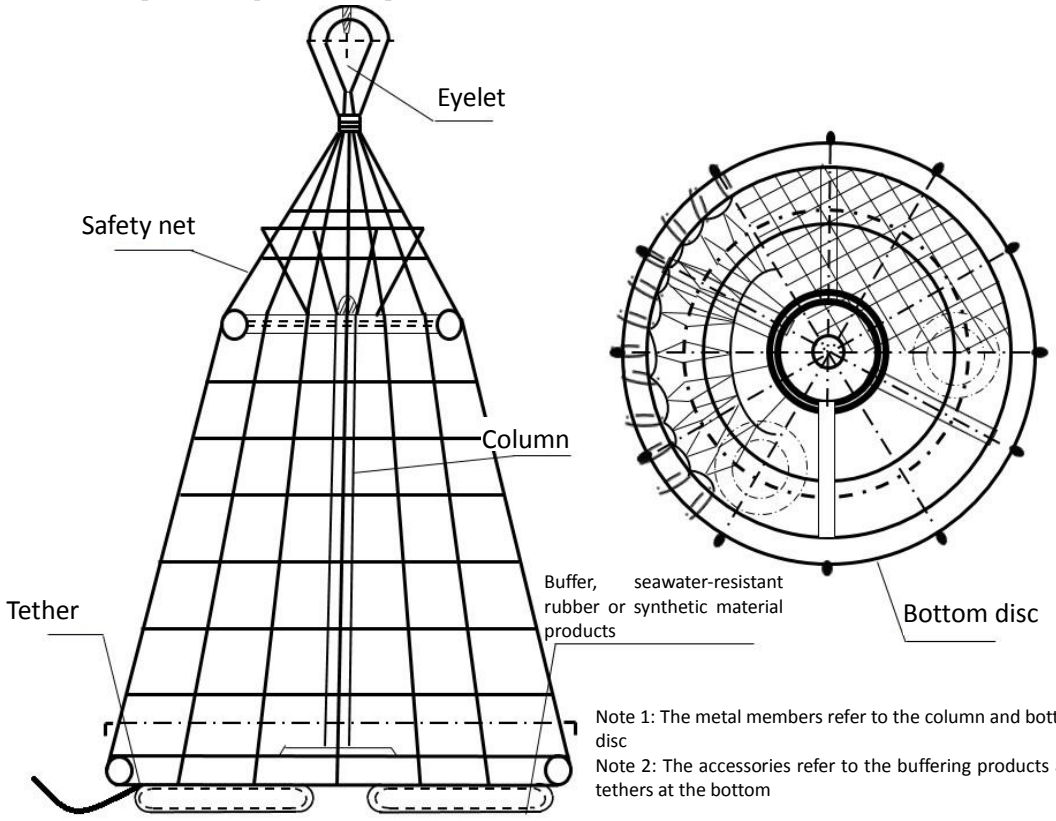

Figure 3.2.1.4 General Structural Configuration of Column Type Manned Hanging Basket

Section 3 COLUMN-FREE MANNED HANGING BASKET

3.3.1 General requirement

3.3.1.1 The safe nets shall meet the relevant provisions in 3.1.5 of the Guidelines.

3.3.1.2 The bottom material of the hanging basket shall have certain buoyancy, buffering capability and resistance to seawater corrosion.

3.3.1.3 The general structural configuration of the column-free manned hanging basket is shown in Figure 3.3.1.3.

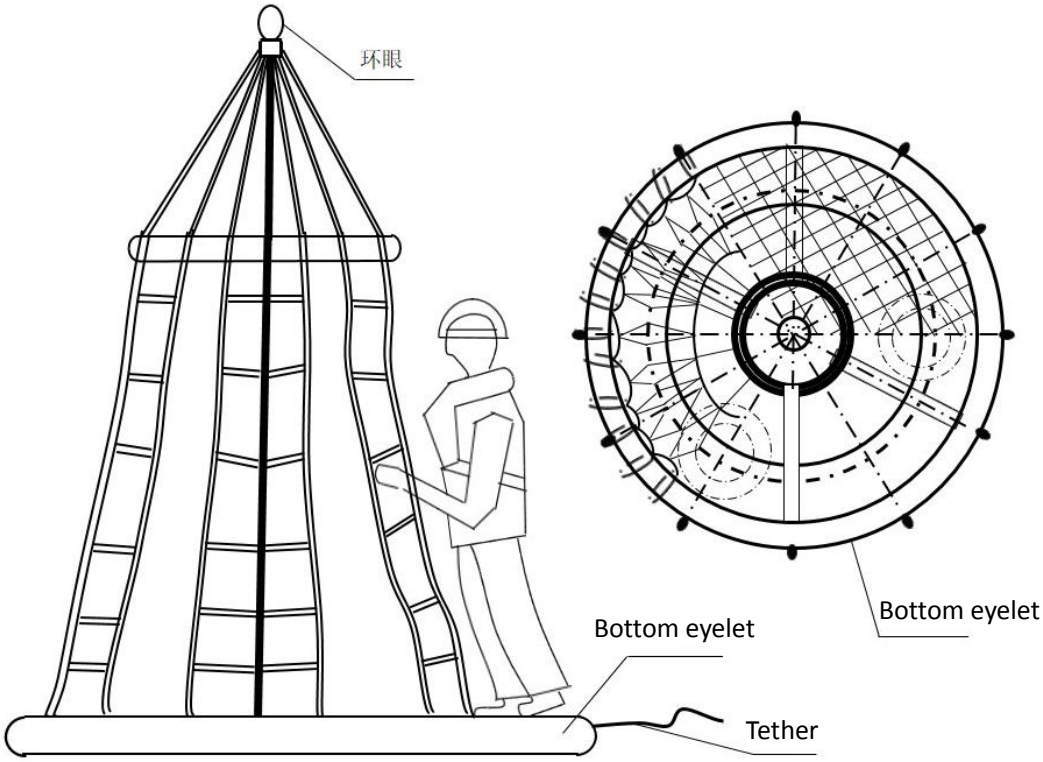

Figure 3.3.1.3 General Structural Configuration of Column-free Manned Hanging Basket

Section 4 FRAME TYPE MANNED HANGING BASKET

3.4.1 General requirement

3.4.1.1 The frame type manned hanging basket shall be designed with the rigid structure and fixed buoyancy configuration. Besides, sufficient protection should be provided in the structure for feet. The influence of wind load shall be considered in structural design.

3.4.1.2 The frame type manned hanging baskets shall be equipped with spring suspension systems, which can provide shock absorption protection for feet during landing at a 4 m/s speed.

3.4.1.3 The handrail of the frame type manned hanging basket shall be located inside, and the height shall not be more than 1.1 m.

3.4.1.4 The frame type manned hanging baskets shall be able to ensure good stability under the highest inclination of 35°.

3.4.1.5 The welds of lifting points and main load-bearing structures shall be subjected to 100% NDT. For specific requirements, please refer to 2.3.1.1 (7) of the Guidelines.

3.4.1.6 The bottom is provided with a damping block made of rubber products with buffering and seawater corrosion resistance and a directional stabilizing rope.

3.4.1.7 The hanging basket has the buoyancy matching with the additional crew, and has self-righting function.

3.4.1.8 The rechargeable lighting shall be installed inside the hanging basket, and the lighting field and intensity shall meet the requirements of riding the hanging basket at night.

3.4.1.9 The general structure configuration of frame type manned hanging baskets is shown in Figure 3.4.1.9.

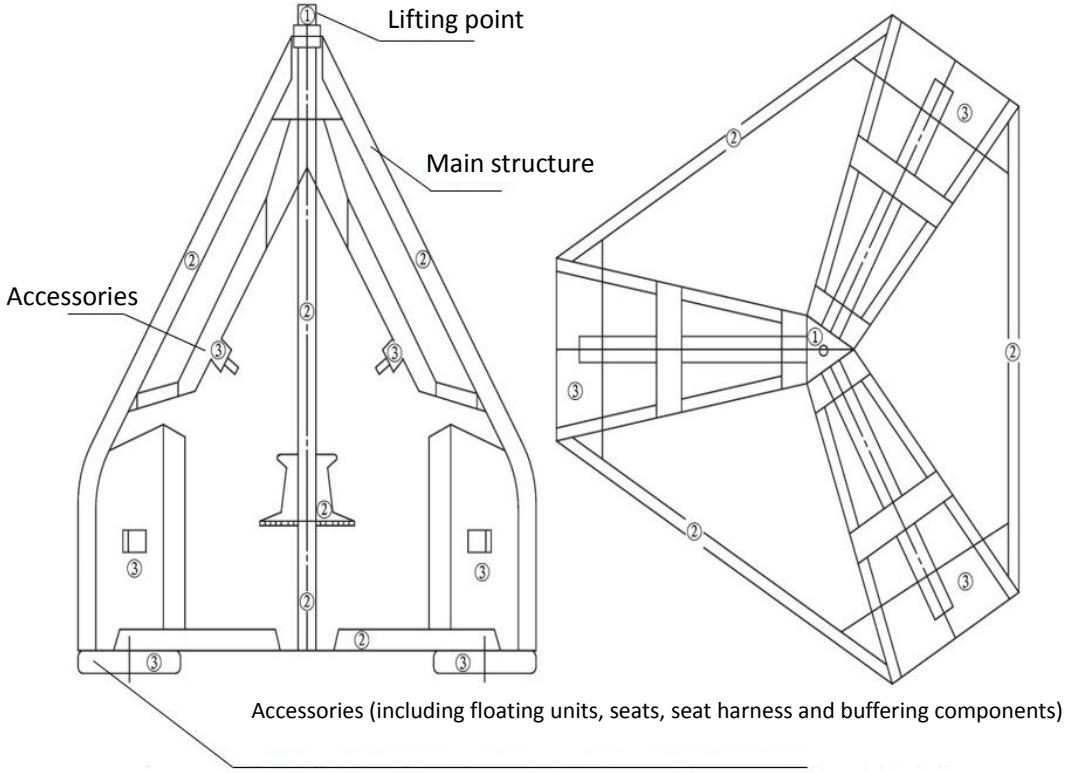

Figure 3.4.1.9 General Structural Configuration of Frame Type Manned Hanging Basket

Section 5 MANNED WORKING BASKET

3.5.1 General requirement

3.5.1.1 The manned working baskets are not allowed to be used as the manned shuttle baskets.

3.5.1.2 Handrails shall be provided inside the manned working basket, with a minimum height of 1 m.

3.5.1.3 The manned working basket shall be provided with a safety belt connection device and a tool-locking device.

3.5.1.4 The main structure shall be made of steel. The bottom shall be provided with a cushion or equivalent material.

3.5.1.5 The lifting point material shall be consistent with or close to the main structure material.

3.5.1.6 The structural strength shall meet the requirements of bearing capacity.

3.5.1.7 If the base plate is provided with the slot structure, the fork structure or supporting structure shall be reserved, but the continuity and integrity of the bottom bearing structure shall not be damaged. Otherwise, the fork shall be properly strengthened locally.

3.5.1.8 Framework structure

(1) The height of the hanging basket shall generally not be less than 1.2 m. If there is a top cover structure, the height shall be not less than 2.0 m.

(2) The height of the protective fence of the hanging basket shall be no less than 1 m.

(3) The fence span shall not be greater than 380 mm, and the lower end shall be equipped with a skirting board with a height no less than 100 mm.

(4) There shall be a steel plate or grille at the bottom for people to stand on.

(5) If there is a door for personnel to enter, the door shall be opened inward and equipped with a safety bolt.

(6) The layout of lifting points shall ensure that the hanging basket is in a vertical state during lifting.

3.5.1.9 The welds of lifting points and main load-bearing structures shall be subjected to 100% NDT. For specific requirements, please refer to 2.3.1.1 (7) of the Guidelines.

3.5.1.10 The general structural configuration of manned working baskets is shown in Figure 3.5.1.10.

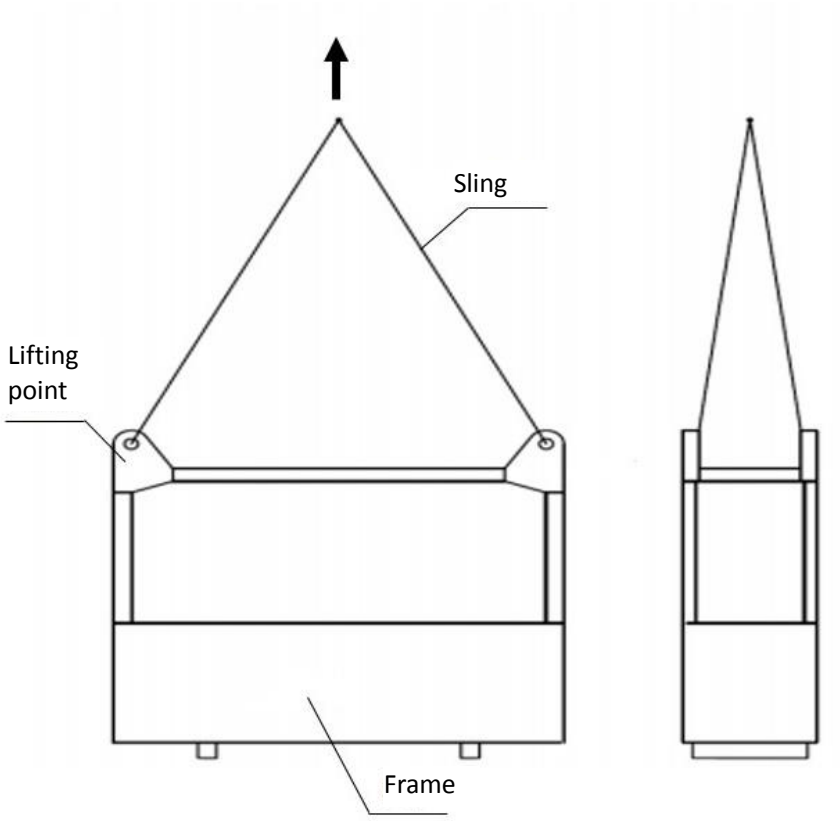

Figure 3.5.1.10 General Structural Configuration of Manned Working Basket

Section 6 CARGO HANGING BASKET

3.6.1 General requirement

3.6.1.1 The main structure shall be made of steel.

3.6.1.2 The lifting point material shall be consistent with or similar to the main structure material.

3.6.1.3 The structural strength shall meet the requirements of bearing capacity.

3.6.1.4 If the base plate is provided with the slot structure, the fork structure or supporting structure shall be reserved, but the continuity and integrity of the bottom bearing structure shall not be damaged. Otherwise, the fork shall be properly strengthened locally.

3.6.1.5 The welds of lifting points and main load-bearing structures shall be subjected to 100% NDT.

Chapter 4 TEST

Section 1 MANNED HANGING BASKET TEST

4.1.1 General requirement

4.1.1.1 The manned hanging basket shall be subjected to the rated load test, emergency braking test, overload operation test, static overload test and sliding test.

(1) The rated load test requires lifting at normal working speed and rated load, so as to observe the operation of the hanging basket and check the stress of all parts of the hanging basket;

(2) The emergency braking test requires observing the emergency stop of the hanging basket and checking the stress of all parts of the hanging basket under rated load during emergency braking;

(3) The overload operation test requires lifting under the condition with 1.5 times the rated load and rated speed, observing the operation of the hanging basket and checking the stress of all parts of the hanging basket;

(4) When the static overload test requires a load of 2 times the rated load, the duration shall not be less than 5 minutes, and the stress of all parts of the hanging basket shall be checked. After the load test, a comprehensive inspection shall be conducted, and there shall be no permanent deformation, cracks or other damage. All welds of load-bearing structural members (including the lifting points) shall be subjected to 100% NDT. For specific requirements, please refer to 2.3.1.1 (7) herein.

(5) For the sliding test, the hook shall quickly slide (without touching the ground) under the rated load. Meanwhile, the sliding state of the hanging basket shall be observed, and the stress of all parts of the hanging basket shall be checked.

Section 2 BUOYANCY TEST

4.2.1 General requirement

4.2.1.1 The manned shuttle basket other than the frame type hanging basket shall be subjected to buoyancy test, and the basket shall not sink under no load.

4.2.1.2 The frame type manned shuttle basket shall be able to float out of the water and upright automatically after falling freely into the water at a certain height, and the parts above the shoulders of the carrying personnel shall be able to emerge from the water.

Section 3 CARGO HANGING BASKET TEST

4.3.1 General requirement

4.3.1.1 The cargo hanging basket shall be subjected to a static overload test for no less than 5 minutes, and the uniform load of the test shall be 2 times the rated load. After the load test, the

hanging basket structure shall be visually inspected, and the weld of the bearing structure shall be subjected to 100% NDT. For specific requirements, please refer to 2.3.1.1 (7) of the Guidelines.

Section 4 TEST REPORT

4.4.1 General requirement

4.4.1.1 The test report shall record such information as the test type, test time, test place, test unit, test load, test instruments, NDT results after test and test conclusion.