GUIDELINES FOR CLIENTS ON SAFETY OF SURVEY

2013

Effective from July 1 2013

CONTENTS

Chapter 1 General

1.1 Occupational health and safety policy of ISC

ISC is committed to the management of occupational health and safety (OHS) risks facing its staff, it determines preventive measures against risks which are to be controlled and urges clients applying for ISC survey/audit services to meet ISC control requirements, exerting a positive influence on the maritime community in continually improving personnel safety management.

1.2 Occupational health and safety objectives of ISC

1.2.1 The occupational health and safety objectives for field surveys conducted by ISC Surveyors are as follows:

(1) All occupational health and safety risks possibly facing ISC staff shall be assessed, and preventive measures shall be determined against risks which are to be controlled.

(2) Applicable laws and regulations for health and safety shall be complied with.

(3) Sufficient training in occupational health and safety shall be provided to ISC staff.

(4) Sufficient resources (personal protective equipment (PPE), a work system for guaranteeing personal safety, etc.) shall be provided to ISC Surveyors/Auditors so as to ensure that classification and statutory survey services are provided to clients in a safe manner.

(5) Clients applying for ISC classification and statutory survey services as well as other controllers in workplaces shall be urged to provide resources necessary for control of occupational health and safety risks so as to ensure safe conduct of surveys.

(6) The right of ISC staff to protect their occupational health and safety shall be guaranteed, the appeals from staff shall be respected, and a channel shall be provided for filing complaints to ISC Impartiality Committee.

(7) Appropriate rights and obligations shall be granted to staff, enabling them to refuse to carry out any work deemed to have an unacceptable risk until such work can be conducted in a safe manner.

1.3 Purpose and application of the Guidelines

1.3.1 The Guidelines provide shipyards, shipowners and manufacturers with guidance on providing conditions for safety of survey to ISC Surveyors, the purpose of which is to promote the compliance of control of occupational health and safety in locations of survey with the relevant national laws and regulations of the State.

1.3.2 The Guidelines are applicable to survey activities conducted on ships and offshore installations, in shipyards and ship repair yards, at manufacturers of marine products and workplaces of suppliers.

1.3.3 In addition to the requirements of the Guidelines, clients applying for ISC survey/audit services are to abide by laws and regulations or other relevant requirements of the State, the Administration and the place of survey.

1.4 Terms

1.4.1 The terms in rules and guidelines issued by ISC apply to the Guidelines.

1.4.2 For the purpose of the Guidelines, the following terms apply:

(1) Surveyor means a person employed by China Classification Society, carrying out survey and audit on behalf of ISC.

(2) Location under survey means a location where a surveyor carries out survey or audit in accordance with the contract of or the application for survey or audit submitted to ISC by the applicant, e.g. relevant locations of shipyards, ships, offshore installations and manufacturers.

(3) Party under survey means a unit which is fully responsible for work safety of the location under survey, e.g. shipyards, ships, offshore installations and manufacturers.

(4) Crossover operation means any construction work, operation of equipment or crack detection etc. still being carried out above and near the means of access adjacent to the location under survey, or above, inside or near such location when the survey or audit is carried out by a Surveyor at the location, covering three/two-dimensional crossover operations.

(5) Confined space means a space that has any of the following characteristics:

- limited openings for entry and exit;
- unfavourable natural ventilation;
- not designed for continuous worker occupancy.

It includes, but is not limited to, boilers, pressure vessels, cargo spaces (cargo holds or cargo tanks), means of access in cargo spaces, ballast tanks, double bottoms, double hull spaces, fuel oil/lube oil/ sewage/tanks, pump rooms, compressor rooms, cofferdams, void spaces, duct keels, interbarrier spaces (e.g. in liquefied gas carries), engine crankcases, caves and pits.

(6) Confined space entry (CSE) means activities of personnel in relation to entering, leaving and working in the confined space.

(7) Competent person means a person with sufficient theoretical knowledge and practical experience, trained in the risks of the confined space and the use of gas measurement instruments and appropriately qualified to make an informed assessment of the change of oxygen concentration in the space and the likelihood of a dangerous atmosphere being present or subsequently arising in the space.

(8) Responsible person means a person authorised to permit entry to a confined space and having sufficient knowledge of the procedure to be followed and other measures to be taken in cases where the safety of the confined space might be affected.

(9) Standby person means a person appropriately trained to be responsible for remaining on the outside of the confined space in constant communication with the survey team inside and initiating emergency procedures in case of accidents.

(10) A marine chemist is a person who possesses a current Marine Chemist Certificate or equivalent.

(11) Adjacent spaces mean those spaces bordering a confined space in all directions, including all points of contact, corners, diagonals, decks, tank tops, and bulkheads.

(12) Toxic product means any chemical liquid, gas or solid material which is toxic, covering products emitting toxic vapours and identified by an entry T in column K of the table in Chapter 17 of the IBC Code, or an entry T in column F of the table in Chapter 19 of the IGC Code, or classified as toxic substances (class 6.1) in Part 2 of the IMDG Code, or identified or classified as "toxic" in any other data sheet.

(13) Permit to enter or permit to work is a written authorization issued by a responsible person with date and time being indicated, which states that the confined space has been tested by a competent person and that the space is safe for entry, what precautions, equipment, etc., are required and which type of operation is allowed.

(14) Narrow space means a small-sized space limited by enclosure, decks, floors, equipment and stiffening structures. For the target of survey in such space, the Surveyor cannot stretch and move as usual and sometimes even has to bend down or crawl adequately in order to complete the survey. Surrounded by steel or hard materials possibly with many edges and corners, especially during the survey between hull structures, the head, hands, feet and other body parts of the Surveyor are susceptible to injuries upon impact, so that appropriate measure must be taken.

(15) Location liable to cause fall from high means a location where the Surveyor, during the survey of a ship, an offshore installation or a large piece of equipment, must reach a significantly higher position to inspect the inside and outside of an area and if not protected, he would easily fall off to be injured in doing so.

(16) Electrical burns mean injuries caused by the thermal effect of electric current, divided into current burns and arc burns. A current burn occurs when the human body touches a live part and it is an injury caused by the thermal energy converted from the electric energy as a result of an electric current passing through the human body. Arc burns are injuries caused by arc discharge, divided into direct and indirect burns. The former is an injury as a result of an electric current passing through the human body due to an arc between the live part and the human body while the latter is an injury of the human body due to a nearby arc, including scalds caused by the splashing of hot molten metal. An arc with a temperature of 8,900℃ or above may cause large and deep burns and can even scorch and burn off limbs and other body parts. A large current passing through the human body may also dry and scorch body tissues.

(17) Accidental release of pressure means an accidental release of energy in a pressure accumulator or a device in tension, which might cause the risk of injuries to personnel.

(18) Dust means production-caused dust, i.e. solid particles resulting from a production process and capable of floating in the atmosphere for a long time. The degree of its hazard to the human body is mainly indicated by the content of free silicon dioxide contained in it. In general, dust is classified into 4 categories according to the content of such dioxide. The maximum hazard is indicated by the content of 70%. Asbestos dust and cast iron dust fall into this category.

(19) Settled cast iron dust means the dust floating again in the atmosphere due to the effect of vibration or air flow, arising from powdered substances used in operations such as mixing, screening, packing and handling during casting process, sand cleaning or production as well as settled dust. The concentration of free silicon dioxide in such dust is greater than 25%.

(20) Asbestos means the fibrous form of mineral silicates belonging to rock-forming minerals of the serpentine group, i.e. actinolite, amosite (brown asbestos, cummingtonite-grunerite), anthophyllite, crocidolite (blue asbestos), tremolite,chrysotile (white asbestos) or any mixture containing one or more of these, please refer to appendix 8 of the 2011 Guidelines for the development of the inventory of hazardous materials (resolution MEPC.197(62).

(21) Moving object means an object moving in a horizontal or close to a horizontal direction, which might cause injuries to personnel upon contact due to the effect of its kinetic energy and sharp shape.

(22) Falling object means an object falling in vertical direction, or rolling or sliding down a steep slope, which might cause injuries to personnel upon contact due to the effect of its kinetic energy and sharp shape.

(23) Collapse of staging means the hazard caused by collapse and fall of a staging due to unsatisfactory erection of the staging, removal of it without following safety requirements, heavy impact and severe weather etc. during survey activities.

(24) Dangerous parts of running equipment mean various moving parts and components or machining areas of mechanical processing equipment which are easily accessible to operators. Common dangerous parts are as follows:

① rotating shaft;

② relative transmission parts, e.g. meshing gears not covered;

③ rotating crankshaft and crank;

④ noncontinuous rotating parts, e.g. fan blade, toothed drums in pairs;

⑤ belt and belt pulley, chain and gipsy;

⑥ rotating abrasive wheel;

⑦ clamping plate between the portable plate and backing strap;

⑧ reciprocating punching tools, e.g. punch and die;

⑨ band cutting tools, e.g. band saw;

⑩ wormwheel and worm;

⑪ surface of high-speed rotating components, e.g. rotor drum of a centrifuge;

⑫ clamp between coupling bar and chain ring;

⑬ rotating cutting tools;

⑭ projection of rotating components, e.g. key,

⑮ rotating stirring machine and stirring

⑯ rotating cylinder with dangerous surface;

⑰ metallic connection on the moving belt (belt clamp);

⑱ flywheel;

⑲ locking screw on the shaft coupling.

(25) Danger from running equipment means the danger of the body or clothes of a person being caught by a rotating mechanical component, or the danger of injuries to personnel caused by possibly accidental splatters from mechanical components in rotation. Common dangers are as follows:

① being caught by a single mechanical component in rotary motion, e.g. main shaft, chuck, feed screw, as well as abrasive wheel and various cutting tools, e.g. milling cutter and saw blade;

② being caught between two mechanical components in rotary motion, e.g. between two rollers rotating in opposite directions and between meshing gears;

③ being caught between a mechanical component in rotary motion and a stationary one, e.g. between an abrasive wheel and its support or between the spoke handwheel of a machine and its body;

④ being caught between a mechanical component in rotary motion and one in linear motion, e.g. between belt and belt pulley, chain and gipsy, rack and gear, pulley and line, or a windlass's winch spool and capstan;

⑤ being struck or rolled by a workpiece in rotary motion, e.g. a slim workpiece extending from a machine tool;

⑥ being struck by the projection of a component in rotary motion, e.g. metallic belt clamps, keys on a rotating shaft, setscrews and coupling screws;

⑦ some components in rotary motion posing a greater danger due to their openings, .e.g. fans, blades, spoke pulleys, gears and flywheels;

⑧ composite motion due to rotary motion and linear motion, e.g. cam drivers, connecting rods and crankshafts;

⑨ cutting tools or mechanical components which are flying off, e.g. blades or joints not securely clamped or fastened, or broken pieces of an abrasive wheel;

⑩ chippings or workpieces which are flying off, e.g. continuously outgoing or broken and scattered chippings, and workpieces flying off during forging.

(26) Location containing hot temperature substances or facilities means a location where the Surveyor may approach or touch substances or facilities which are liable to cause burn or scalding during survey activities. Hot temperature substances causing burns are hot temperature gases, solids and liquids.

(27) Location containing cold temperature substances or facilities means a location where the Surveyor may touch substances or facilities which are liable to cause frostbite during survey activities. Cold temperature substances causing frostbite are cold temperature gases, solids and liquids.

(28) Hot temperature substance means a substance with surface temperature of 45℃ or above.

(29) Hot temperature location means a location with an ambient temperature exceeding 35℃.

(30) Cold temperature substance means a substance with surface temperature of 0℃ or below.

(31) Cold temperature location means a location with an ambient temperature below 5℃.

(32) Injury caused by intense light radiation and by heat radiation means an injury which might, during inspections of marine products, be caused by such radiation from metal liquid, hot temperature metal and flaming during the process of smelting, moulding, rolling or heat treatment.

1.5 References

The paragraphs of the following laws, regulations, conventions, guidelines, standards and technical information contain provisions, which are referred to in the Guidelines, constitute paragraphs of the Guidelines. All the documents may be revised and their latest versions are to be used insofar as practicable when applying the Guidelines.

(1) Law of the People's Republic of China on Work Safety (Order of the President No.70);

(2) Regulations of the People's Republic of China on the Prevention and Control of Pneumoconiosis;

(3) International Convention for the Safety of Life at Sea, 1974;

(4) Convention concerning Safety in the Use of Asbestos of International Labour Organization;

(5) IACS REC 72 – Confined Space Safe Practice;

(6) IACS PR 37 – Procedural Requirements for Safe Entry of Confined Spaces;

(7) IACS REC 74 – A Guide to Managing Maintenance in accordance with the Requirements of the ISM Code;

(8) IACS REC 78 – Safe Use of Portable Ladders for Close-up Surveys;

(9) GB 8958-2006 – Safety rules for hazardous work in oxygen deficiency atmosphere;

(10) GB/T 12301 – Detection methods for harmful gas evolved from non-dangerous cargo in holds;

(11) GB 12942-91 – Safety code for painting—Technical requirements of safety for working in confined spaces;

(12) GB/T 20098-2006 – General technical requirements for protective boot use at low temperature workplace;

(13) GB/T 4200-2008 – Classified standard of working in the hot environment;

(14) GB/T 14440-93 – Classified standard of working in the cold environment;

(15) GB 5083-1999 – General rules for designing the production facilities in accordance with safety and health requirements;

(16) GB 2894-2008 – Safety signs and guideline for the use;

(17) GBZ 158-2003 – Warning signs for occupational hazards in the workplace;

(18) GB/T 15236-2008 – Occupational safety and health glossary;

(19) GB/T 12801-2008 – General principles for the requirements of safety and health in production process;

(20) GB/T 11651-2008 – Code of practice for selection of personal protective equipment;

(21) GB/T 13861-2009 – Classification and code for the hazardous and harmful factors in process;

(22) GB/T 20801.6-2006 – Pressure piping code – Industrial piping – Part 6: Safeguarding;

(23) GB6067-2010 – Safety rules for lifting appliances;

(24) GB 6441-1986 – The classification for casualty accidents of enterprise staff and workers;

(25) GB 50058-1992 – Electrical installations design code for explosive atmospheres and fire hazard;

(26) GBJ 65-83 – Code for earthing design of industrial and civil electrical installations;

(27) GBJ 64-83 – Code for design of overvoltage protection of industrial and civil electrical installations;

(28) GB 2893-2008 – Safety colours;

(29) GB 50054-2011 – Code for design of low voltage distribution;

(30) GB/T 3787-2006 – Technical safety code for management, operation, inspection and maintenance of hand-held motor-operated electric tools;

(31) GB 50056-93 – Code for design of electrical installations of electrical heating equipment;

(32) GBZ/T 192.1-2007 – Method for determination of dust in the air of workplace;

(33) GB 4053.1～.4 – Safety requirements for fixed steel ladders and platforms;

(34) Code for installing and acceptance of electrical installations (GB50254-96, GB50255-96, GB50256-96, GB50257-96);

(35) CB 4204 – Technical requirements for safety of marine staging;

(36) CB 3785-1997 – Safety procedures for height operation in shipyard;

(37) CB 3787 – Safety procedures for transportation operation in shipyard;

(38) CB 3660-1997 – Safety procedures for lifting operation in shipyard;

(39) CB 3785-1997 – Safety procedures for height operation in shipyard;

(40) LD48-93 – Lifting appliances – Load handing devices and Slings – Safety rules;

(41) JBJ 6-1996 – Code for electrical design of machine factory;

(42) LD84-95 – Classification of hazard of production-caused dust for operations;

(43) General rules of the industry in relation to locations containing hot or cold temperature substances or facilities, e.g. General rules for work safety of casting shops, General rules for work safety of forging shops, Safety rules for steelmaking etc.;

(44) General rules of the industry in relation to locations with a risk of accidental release of pressure, e.g. Safety operating procedures for hydraulic test, Safety operating procedures for lifting appliances, etc.;

(45) Procedures for management of electrical safety ([86] Jishengzi No.76).

Chapter 2 General Requirements

2.1 General requirements

2.1.1 It is the full responsibility of the party under survey to ensure that the space is safe to enter. The Surveyor has the right to refuse to enter an unsafe and/or unknown space until all safety requirements are met, if he/she is not confident that the space is safe.

2.1.2 The location under survey is to establish relevant provisions for the management of work safety and relevant personnel are to be familiar with rules for safe operation in order to guarantee the basic safety of operators and surveyors.

2.1.3 A responsible person familiar with the location under survey is to be assigned to accompany the surveyor at all times.

2.1.4 Personnel who operate equipment independently must be trained in rules for operation and safety.

2.1.5 Where applicable, good natural ventilation is to be provided in indoor work areas. Ventilators, fans or other equipment of sufficient ventilation capacity are to be provided in places where smoke, vapour and any other gas or dust harmful to the human body cannot be removed by the natural circulation of air.

2.1.6 The work area of the location under survey is to be so arranged as to guarantee an adequate safe space for activities of personnel. Safe access is to be provided in order to ensure that production personnel and surveyors will be safely protected and evacuated timely and effectively in a dangerous situation. For the erection of a staging, a notice board is to be placed at the entrance and exit of the means of access after safety is fully confirmed. Effective guardrails or safety nets are to be provided for means of access from which fall would easily occur.

2.1.7 Sufficient lighting is to be provided for survey at night or in spaces so as to ensure adequate inspection of the target of survey and means of access.

2.1.8 Isolation of the location under survey is to comply with the following requirements:

2.1.8.1 It is to ensure that mechanical equipment which might cause falling or moving of any object and/or moving objects are isolated or effectively controlled.

2.1.8.2 A notice board is to be placed near the isolated equipment concerned.

2.1.8.3 Unless agreed beforehand, crossover operations such as welding, painting, grinding, sand blasting, hydro blasting, NDT using X-ray or chemicals, which might cause any hazard or damage, are to be adequately isolated.

2.1.8.4 It is to ensure that electrical equipment in the space under survey is appropriate and in an acceptable condition.

2.1.9 When the survey requires entry into locations of highly hazardous operations with special risks, such as those of hot work operation and confined space operation, the validity of the permit to work/safety confirmation document on site is to be confirmed, and ensure that the approval/safety confirmation procedures have been strictly implemented. The permit to work includes analysis of hazardous factors and safety measures (where applicable).

Chapter 3 Safety Requirements for Specific Locations of Survey

3.1 Confined space

3.1.1 Operation management

3.1.1.1 Clients are to establish approval procedures for operations in confined spaces so as to guarantee the safety and health of operators and surveyors entering confined spaces.

3.1.1.2 For the survey and audit of ships in operation, the ship's ISM or NSM system generally requires a permit to enter/permit to work to be issued for entry into a confined space in accordance with relevant procedures (e.g. permit to enter, safe operation certificate of personnel, safe hot work operation certificate). Offshore installations normally have a similar permit-to-work system.

3.1.1.3 Entry into a confined space is only to be allowed when a separate permit to enter has been issued. This permit is only to be issued after tests have taken place to ensure that the atmosphere is safe to breathe.

3.1.2 Prior to entry into a confined space, the location under survey is to adequately assess and confirm the following safety measures (if applicable):

3.1.2.1 In order to be able to identify the hazards in the space to be surveyed and assess the risks, it is the responsibility of the party under survey to provide the following information to the Surveyor:

(1) latest content of the spaces to be surveyed is to be identified and the content in spaces adjacent to them;

(2) for gas carriers: a data sheet for the last cargo is to be presented;

(3) for chemical tankers: a data sheet for the previous three cargoes is to be presented.

3.1.2.2 Relevant documents are to be checked to confirm that the confined space is sufficiently clean and provided with adequate means of ventilation operating in good order so that the safety of operation is ensured.

3.1.2.3 Confirm that the procedures for safe entry are implemented, with relevant permits or certificates (e.g. permit to enter, safe operation certificate of personnel, safe hot work operation certificate) being issued and kept correctly in relevant places and being valid.

3.1.2.4 Relevant arrangements for entering, leaving and remaining in confined spaces are to ensure safety. Means of access are to be opened for entry and exit as much as possible.

3.1.2.5 Evaluate and confirm the ventilation of the space:

(1) Ventilation is to be continuous where possible because in many confined spaces the hazardous atmosphere will form again when the flow of air is stopped. All openings are to be opened for ventilation including emergency exit.

(2) De-ballasting a tank does not guarantee a safe atmosphere. Testing of the atmosphere is still required.

(3) The air intake for the ventilation system is to be located in an area that is free of combustible dusts and vapours and toxic products.

(4) For tankers, the inert gas fans are not to be used to provide fresh air ventilation because contaminants from the inert gas lines could be introduced into the tanks.

(5) When other tanks in an inert condition are either adjacent or interconnected (e.g. pipeline) to the space to be entered, the Surveyor is to be alert to the possibility of inert gas leaking into that space through, for example, bulkhead fractures or defective valves. The risk of this occurring can be minimized by maintaining a small but positive pressure in the space to be entered relative to the inert gas pressure. At all times the procedures on the ship are to be followed.

3.1.2.6 Evaluate and confirm the isolation of relevant risks:

(1) The operation of ballast water is to be prohibited during survey by the Surveyor, unless agreed beforehand.

(2) Confirm that the confined space is adequately isolated from other compartments, cargo spaces and pipelines. Inert gas, exhaust, vapour, liquid cargo or pressure pipelines which pass through or are led into the space to be surveyed are to be adequately isolated and blanked off. Related systems are to be stopped, unless their operation is deemed necessary and agreed beforehand.

(3) Confirm that mechanical equipment which might cause falling or moving of any object and/or moving objects are isolated or effectively controlled.

(4) A notice board is to be placed near the isolated equipment concerned.

(5) Unless agreed beforehand, operations such as welding, painting, grinding, sand blasting, hydro blasting, NDT using X-ray or chemicals, which might cause any hazard or damage, are to be adequately isolated.

(6) Confirm that electrical equipment in the confined space is appropriate and in an acceptable condition.

3.1.2.7 It is to ensure that the openings flush with decks or platforms are adequately protected or isolated.

3.1.2.8 Where it is necessary for survey in the confined space, confirm the appropriate erection and arrangement of staging and ladders. Equipment accessible at high altitude is to be operated by qualified personnel.

3.1.2.9 The factors of extremely hot or cold temperature are to be considered. When working at extreme temperatures the working hours are to be adjusted to avoid the most extreme temperatures during the day. Never take any chances and pay careful attention when performing work in extreme temperature environment. Working speed and rest schedule are to be adjusted according to the temperature.

3.1.2.10 Arrangement of responsible person and competent person:

(1) The person carrying out gas measurement within a tank (hold) is the competent person.

(2) The party under survey is to arrange a responsible person to accompany the Surveyor during survey.

3.1.2.11 Ensure that a standby and/or rescue team is in place

(1) A dedicated standby person is to be assigned by the location under survey to remain on the outside of the confined space when the Surveyor carries out survey inside and be in constant contact (visual or two-way voice communication, e.g. walkie-talkie) with the survey team inside. Routines for communication intervals between the standby person and the responsible person accompanying the Surveyor are to be established. Smooth communication between watch personnel (bridge, cargo control room or engine control room) and the standby person is to be maintained.

(2) The standby person is to have appropriate means to initiate emergency response. The emergency response arrangements of the party under survey are to be readily available.

3.1.2.12 Check and evaluate gas measurements

(1) As a minimum, oxygen measurements are to be carried out before entry into the confined space. When found necessary the measurements are to be taken under the supervision of the Surveyor.

(2) Initial testing is to be carried out by a certified marine chemist or a competent person or a similar accredited person. In no case is the Surveyor to be considered to be a competent person – even if he is equipped with his own personal testing equipment. The Surveyor is always to use the personal testing equipment during survey.

(3) Ventilation is to be stopped about 10 minutes before tests are made and not restarted until the tests are completed.

The testing is to be carried out in the following sequence:

- oxygen atmospheres;
- flammable atmospheres;
- toxic atmospheres when considered necessary.

(4) Testing for oxygen

Any atmosphere with the range of 20.6% to 22% oxygen by volume is not to be entered. Oxygen measurements are to becarried out immediately before entry into the confined space.

(5) Testing for flammable atmosphere

Under no circumstances is the Surveyor to enter a space with an atmosphere with more than 5% of the “Lower Flammable Limit” (LFL) or “Lower Explosive Limit” (LEL), on a combustible gas indicator. The flammability indicator shows the percent within a safety range of 0～5% of the Lower Explosive Limit (LEL) and, ideally, is to read 0%.

(6) Testing for toxic atmospheres

Toxins are measured in parts per million (PPM). The Surveyor is not allowed to enter a confined spaceexceeding the limits specified below (different test facilities may have the different safety limits).

Gas	Limit 8 Hour work shift [ppm]	Limit 15 min working [ppm]
Benzene (C_6H_6)	1	5
Hydrogen Sulphide (H_2S)	5	20
Carbon Dioxide (CO_2)	5	30
Carbon Monoxide (CO)	25	50
Nitrogen Dioxide (NO_2)	1	3
Nitrogen Monoxide (NO)	25	50
Sulphur Dioxide (SO_2)	2	5

(7) For ships or offshore installations in service, if it takes a long time to carry out survey in a confined space, the testing for gases is to be carried out periodically during stay in the confined space. The competent person is to measure gases according to the requirements of the system on board and update the records on the permit to enter. Measurements are to be taken at an interval not exceeding 2 h.

3.1.2.13 Testing is to be carried out to demonstrate the safe condition of gases in the space (safety limit: oxygen by volume is within the range of 20.6% to 22%, flammable gas is less than 5% of LEL, and toxic substances are within an acceptable range).

3.1.2.14 Evaluate and confirm the lighting arrangement

(1) The lighting in confined spaces is to be sufficient so as to ensure safe entry and exit and operation. Whenever possible, natural lighting is to be provided in the tank during inspection by opening all tank hatches. Lighting in confined spaces may be temporary arrangements cabled into the space. An electric torch is always to be carried by the Surveyor.

3.1.2.15 Evaluate if special clothing and/or equipment are required.

3.1.3 Control of oxygen content

3.1.3.1 Clients are to use ventilation in accordance with GB8958-2006 – Safety rules for hazardous work in oxygen deficiency atmosphere, in order to control the oxygen content in the atmosphere of confined spaces and prevent asphyxiation.

3.1.4 Control of flammable and toxic gases

3.1.4.1 Clients are to control the contents of flammable and toxic gases in the atmosphere of confined spaces and prevent explosion and poisoning in accordance with GB 50493-2009 – Code for the design of combustible gas and toxic gas detection and alarm for petrochemical industry. Prior to entry into a confined space, the Surveyor is to be provided with appropriate detection instruments and conduct satisfactory detection in accordance with GB 12358 – Gas monitors and alarms for workplace – General technical requirements. Such detection instruments are to be calibrated in accordance with the Metrology Law of the People's Republic of China.

3.1.4.2 Personnel carrying out oxygen and explosion measurements are to be appropriately qualified according to the provisions of the Management of Training and Assessment of Special Operations Personnel in Safety Technologies.

3.1.5 Measures for operations high above ground

3.1.5.1 If the Surveyor needs to conduct survey high above ground within a confined space, various measures for this meet corresponding national or shipyard standards are to be ensured. For example: Staging is to comply with CB 4204 – Technical requirements for safety of marine staging.

Vertical and inclined steel ladders and platforms are to comply with GB 4053.1～.4 – Safety requirements for fixed steel ladders and platforms.

Guardrails and handrails are to comply with GB 4053.3 – Safety requirements for fixed industrial guardrails.

Where lifting is needed or a hoist is to be used for the survey, the requirements of JGJ 5027 – Safety code for suspended platforms and GB 10055-1996 – Safety code for builders' hoist are to be complied with.

3.1.6 Use of special equipment

3.1.6.1 Where special equipment such as overhead trolleys and hoists is used by the shipyard to assist the Surveyor, such equipment is to be regularly inspected in accordance with the Regulations on Safety Supervision of Special Equipment to ensure its satisfactory condition. Related operators are to be appropriately qualified according to the provisions of the Management of Training and Assessment of Special Operations Personnel in Safety Technologies.

3.2 Narrow space

3.2.1 The location under survey is to establish relevant provisions for the management of work safety and relevant personnel are to be familiar with rules for safe operation in order to guarantee the basic safety of operators and surveyors.

3.2.2 A responsible person familiar with the location under survey is to be assigned to accompany the Surveyor at all times.

3.2.3 Personnel who operate equipment independently must be trained in rules for operation and safety.

3.2.4 Sufficient lighting is to be provided for survey at night or in spaces so as to ensure adequate inspection of the target of survey and means of access.

3.2.5 Areas adjacent to the structure or equipment under survey are to be clean and free from sundries. The floor of means of access is to be free from oily dirt. The positions of standing at and climbing onto the structure are not to be wet and slippery.

3.3 Location liable to cause fall from high

3.3.1 The location under survey is to establish relevant provisions for the management of work safety and relevant personnel are to be familiar with rules for safe operation in order to guarantee the basic safety of operators and surveyors.

3.3.2 A responsible person familiar with the location under survey is to be assigned to accompany the Surveyor or Auditor at all times.

3.3.3 Sufficient lighting is to be provided for survey at night or in spaces so as to ensure adequate inspection of the target of survey and means of access.

3.3.4 Where the hatch cover of cargo hold 'tween deck is to be used as the means of access during survey, sufficient light is to be provided by opening the hatch cover of upper deck.

3.3.5 Areas adjacent to the structure or equipment under survey are to be clean and free from sundries. The floor of means of access is to be free from oily dirt. The positions of standing at and climbing onto the structure are not to be wet and slippery.

3.3.6 Staging, stairways and handrails are to be of adequate strength and well secured. Any suspended passage is to be provided with handrails and external safety net. Clear notice boards are to be placed at openings for entry and exit.

3.3.7 The overhead trolley or suspended platform used to assist the Surveyor is to be operated by a designated and qualified person and maintained effectively.

3.3.8 The robustness of means of access and stairways used for survey as well as their handrails and guardrails is to be ensured. The openings flush with decks or platforms are to be protected or isolated by means of covers or guardrails.

3.4 Location liable to cause fall into water

3.4.1 The location under survey is to establish relevant provisions for the management of work safety and relevant personnel are to be familiar with rules for safe operation in order to guarantee the basic safety of operators and surveyors.

3.4.2 A responsible person familiar with the location under survey is to be assigned to accompany the Surveyor or Auditor at all times.

3.4.3 Sufficient lighting is to be provided for survey at night or in spaces so as to ensure adequate inspection of the target of survey and means of access.

3.4.4 Staging, stairways and handrails are to be of adequate strength and well secured. Any suspended passage is to be provided with handrails and external safety net. Clear notice boards are to be placed at openings for entry and exit.

3.4.5 The overhead trolley or suspended platform used to assist the Surveyor is to be operated by a designated and qualified person and maintained effectively.

3.4.6 A safety net is to be provided when the survey is carried out overboard.

3.4.7 When the survey of a ship is carried out using a boat or raft, attention is to be given to compliance with the relevant requirements of paragraph 5.1.6 Preparations for survey of Chapter 5, PART ONE of ISC Rules for Classification of Sea-going Steel Ships and IACS REC 39 – Safe use of rafts or boats for survey. Such boats or rafts are to be maintained in a satisfactory condition. Sufficient lifejackets are to be available and kept in a satisfactory condition.

3.4.8 A back-up team is to continuously observe the work and keep smooth communication with the survey team.

3.5 Location containing flammable and explosive substances

3.5.1 The location under survey is to establish relevant provisions for the management of work safety (including provisions for the management of flammable and explosive substances) and relevant personnel are to be familiar with rules for safe operation in order to guarantee the basic safety of operators and surveyors.

3.5.2 A sign of no open flames is to be placed in the location and a regular patrol is to be conducted.

3.5.3 The electrical equipment in a location where flammable and explosive substances may be present is to be intrinsically safe and maintained effectively.

3.5.4 Effective ventilation is to be maintained throughout the location where flammable and explosive substances may be present, in order to prevent the accumulation of flammable gases in dead corners. The air inlet and outlet are to be arranged far from any source of ignition. The air intake for the ventilation system is to be located as far as practicable from any combustible dust, vapour or toxic product.

3.5.5 A responsible person familiar with the location under survey is to be assigned to accompany the Surveyor or Auditor at all times.

3.5.6 Sufficient lighting is to be provided for survey at night or in spaces so as to ensure adequate inspection of the target of survey and means of access.

3.5.7 Control of oxygen content

Clients are to use ventilation in accordance with GB8958-2006 – Safety rules for hazardous work in oxygen deficiency atmosphere, in order to control the oxygen content in the atmosphere of confined spaces and prevent asphyxiation.

3.5.8 Control of flammable and toxic gases

Clients are to control the contents of flammable and toxic gases in the atmosphere of confined spaces and prevent explosion and poisoning in accordance with GB 50493-2009 – Code for the design of combustible gas and toxic gas detection and alarm for petrochemical industry. Prior to entry into a confined space, the Surveyor is to be provided with appropriate detection instruments and conduct satisfactory detection in accordance with GB 12358 – Gas monitors and alarms for workplace – General technical requirements. Such detection instruments are to be calibrated in accordance with the Metrology Law of the People’s Republic of China.

Personnel carrying out oxygen and explosion measurements are to be appropriately qualified according to the provisions of the Management of Training and Assessment of Special Operations Personnel in Safety Technologies.

3.6 Location containing hot or cold temperature substances or facilities

3.6.1 When the temperature of the location exceeds 35℃ in summer, effective cooling measures are to be taken. A local supply fan needs to be fitted in hot temperature work areas and harmful substances in such areas are not to be blown to the human body.

3.6.2 Where any hot or cold part of the equipment might be hazardous, it is to be appropriately isolated.

3.6.3 A safety warning sign is to be placed in areas where personnel are susceptible to burn, scalding or frostbite.

3.7 Location with a risk of accidental release of pressure

3.7.1 Necessary isolation measures are to be taken for the source of hazard (e.g. the part under high pressure), and necessary protective devices are to be provided in order to prevent personnel from coming into contact with the source of hazard.

3.7.2 Lifting appliances and their parts and components (e.g. cable wire) are to be inspected and maintained in accordance with relevant survey requirements, in order to prevent the accidental release of energy due to accidental fracture.

3.7.3 Testing/pressure test equipment is to be reasonably selected according to the pressure of the product under survey. Testing equipment is to be certified according to relevant requirements.

3.8 Location containing running equipment

3.8.1 Specific operating requirements

3.8.1.1 It is to ensure that each component of the running equipment is secure without loosening and swinging.

3.8.1.2 Prior to operation of the equipment, it is to ensure that the equipment is free of sundries, scraps or other debris, in order to prevent injuries to personnel due to accidental spatter.

3.8.1.3 It is to ensure that areas adjacent to the running equipment is clean and free of oil and water stains.

3.8.2 Requirements for protective devices

3.8.2.1 Protective devices (e.g. coupling shield, protective cover of belt, damper, protective screening) are to be fitted by clients in accordance with relevant provisions, in order to prevent injuries to personnel due to the exposure of rotating components or being close to high speed rotating components.

3.8.3 A conspicuous safety sign is to be placed near the running equipment.

3.9 Location liable to cause electric shock

3.9.1 The location under survey is to establish relevant provisions for the management of work safety and relevant personnel are to be familiar with rules for safe operation in order to guarantee the basic safety of operators and surveyors.

3.9.2 The electrical connection points on electrical installations and lines are to have good contact and reliable connection.

3.9.3 The high voltage testing station (room) is to be provided with a shielding system. The shielding connection to doors and windows is to be reliable.

3.9.4 During the on-site test of electrical appliances and the test of products of large capacity, the electric test and discharge of the tested product are to be carried out before and after the test.

3.9.5 A notice board is to be placed at the relevant equipment or facilities which might cause electric shock.

3.10 Location containing toxic and harmful substances

3.10.1 Operation management

3.10.1.1 The party under survey is to establish procedures for control of toxic and harmful substances, including project management measures, operation methods and health requirements for workplaces, control the dust hazard of spaces which the Surveyor will enter, in order to guarantee the health and safety of operators and surveyors.

3.10.1.2 All locations under survey where the hazard due to toxic and harmful dust may be present are to be isolated or effectively controlled by the party under survey.

3.10.1.3 A notice board is to be placed by the party under survey in locations possibly containing excessive toxic and harmful dust.

3.10.1.4 The party under survey is to inform the Surveyor of any hazard due to toxic and harmful dust that may be present in the location under survey, especially 4 types of dust such as cast iron dust, asbestos dust, and stop the activities of requesting survey in case of excessive dust or any uncontrollable hazard.

3.10.2 Operation measures

3.10.2.1 Control of cast iron dust

The party under survey is to stop operations such as sand casting and grinding during survey of castings and forgings by the Surveyor, otherwise special measures are to be taken to control the dust in order to reduce the hazard to an acceptable level.

3.11 Location with a risk of being struck by moving or falling objects

3.11.1 Operation management

3.11.1.1 The location under survey is to establish relevant provisions for the management of work safety and carry out effective control of falling objects or moving objects which might cause injuries, in order to guarantee the safety of operators and surveyors in the related locations or their adjacent areas.

3.11.2 Operation measures

3.11.2.1 Various measures which may be used by the location under survey meet relevant national or industry standards are to be ensured. For example:

(1) Staging is to comply with CB 4204 – Technical requirements for safety of marine staging.

(2) Vertical and inclined steel ladders and platforms are to comply with GB 4053.1~.4 – Safety requirements for fixed steel ladders and platforms.

(3) Guardrails and handrails are to comply with GB 4053.3 – Safety requirements for fixed industrial guardrails.

(4) Operations at heights are to comply with CB 3785 – Safety procedures for height operation in shipyard.

(5) Transportations within shipyards are to comply with CB 3787 – Safety procedures for transportation operation in shipyard.

(6) Lifting operations in shipyards are to comply with CB 3660-1997 – Safety procedures for lifting operation in shipyard.

(7) Relevant operations on ships and at docks are to meet the requirements of the relevant safety regulations and standards.

(8) Manufacturing and testing operations of manufacturers of marine rolled steels, steel forgings and anchor chains are to meet the requirements of the relevant safety regulations and standards.

3.12 Location with a risk of structural collapse

3.12.1 Operation management

3.12.1.1 The party under survey is to establish control procedures to regulate the erection and removal of staging, in order to guarantee the safe use of staging.

3.12.1.2 The facilities and locations, for which it is confirmed that the risk of structural collapse may be present, are to be isolated or effectively controlled.

3.12.1.3 A notice board is to be placed at the related facilities or locations of which the risk of structural collapse may be present.

3.12.2 Operation measure

3.12.2.1 The party under survey is to ensure that the erection of staging complies with the following requirements:

(1) Staging is to comply with CB 4204 – Technical requirements for safety of marine staging.

(2) Vertical and inclined steel ladders and platforms are to comply with GB 4053.1~.4 – Safety requirements for fixed steel ladders and platforms.

(3) Guardrails and handrails are to comply with GB 4053.3 – Safety requirements for fixed industrial guardrails.

3.12.2.2 The party under survey is to guarantee that the staging used by the Surveyor in the location under survey has been satisfactorily inspected by its security department and marked accordingly in a conspicuous position.

3.12.2.3 The party under survey is to guarantee that the safety of the Surveyor is not impaired by the following factors during survey:

(1) use of a staging which is still under erection or removal of a staging in use, especially prohibited operations not following safety requirements;

(2) accidental impact on the staging by a lifted structure or object due to an incorrect operation etc.;

(3) severe weather and other adverse effects.

3.13 Location with radiation

3.13.1 Operation management

3.13.1.1 The location under survey is to establish relevant provisions for the management of work safety, control the temperature of the location and prevent the injuries caused by intense light radiation and by heat radiation insofar as practicable.

3.13.1.2 The locations, for which it is confirmed that the risk of radiation may be present, are to be isolated or effectively controlled.

3.13.1.3 A notice board is to be placed in related locations in which the risk of radiation may be present.

3.13.1.4 The party under survey is to provide the Surveyor with special protective clothing and devices required for work in the location under survey.