FOREWARD.

This syllabus is the fifth edition of the study guide for candidates preparing to sit the associate and full membership entry examination. It was compiled by BACS members, for BACS members and is not intended for commercial publication, distribution or for any generation of revenue or profit. As such it may not be reproduced or shared other than for the private use of BACS Members.

By the time that you are reading this guide, you will have been practising as a cargo surveyor for at least two years.

You will have learnt the most valuable lessons of your career 'on the job' and will have found support and encouragement of other BACS members from within or outside your company or practice.

The associate and full membership examinations are intended to test our surveyors, whether at the beginning of their career or whether approaching formal qualification later on. This is to reassure our clients, be it cargo insurers, brokers, shippers, owners, P & I Associations etc., and the people who depend on our professionalism, that a BACS Surveyor has attained at least a level of experience and expertise that they can work effectively to gather the facts of the claim and to mitigate the loss.

In addition, the full-membership examination proves that successful candidates have the essential knowledge to fulfil most of the survey and investigation instructions that may arise, combined with enough experience to identify the more complex cases and to adapt to them appropriately and cautiously.

The syllabus describes the work that you may be doing on a daily basis or that you might well be called upon to do. It sets the tone for the depth of knowledge and understanding required successfully to answer the examination questions.

The association expects that candidates will study the syllabus and identify their own needs for further reading or training – liaising with their employer or seeking advice and mentoring from other members. Advice on mentoring is always available from the BACS Committee.

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PART 1 : GENERAL KNOWLEDGE.

1.1 - SURVEYORS' OBLIGATIONS

The surveyor's primary obligation is to protect the interests of his client, but this must always be weighed against the equally important obligation to be a fair, reasonable, and independent investigator, to be a reporter of facts and to seek to mitigate any loss. You are not instructed to interpret any insurance policy or any other contract and are not there to impart any legal advice or legal opinion, the latter being the job of any instructed lawyer.

Surveyors should remember that any claim or incident could result in litigation or arbitration, at which the actions, discussions, notes and reports of the surveyors will be critiqued and scrutinised in depth, and possibly held to the highest standards of professional expertise and integrity.

Such court proceedings could involve the surveyor acting on behalf of insurers in attempts to recover money from third parties (or from a P & I association defending such a claim) and it is therefore important that accurate notes are kept, preferably in a bound notebook to avoid any possible rejection by the court of loose-leaf notes where it could be inferred that these had been tampered with. Such records should be clearly identifiable with the date and survey reference to which they refer and the actual method of ensuring this traceability remains the responsibility of the surveyor/company.

Another important aspect of damage surveys is to ensure that sufficient clear photographs are taken to illustrate the problems that will be the subject of an eventual insurance claim. It is important to ensure that adequate backups of digital photographs are retained and that individual images are clearly linked to the relevant survey and case file.

All such records, including notes, photographs and files, should be kept for a minimum of seven years and, in some instances where claims are of a significant magnitude, consideration should be given to retaining records for significantly longer.

Before any file is disposed of, the instructing client should be contacted, and their permission sought.

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1.2 – SURVEYOR'S "TOOL KIT"

A surveyor should always be prepared to arrive on survey with all necessary equipment to undertake the required instruction. There are items which every surveyor should have available and which will be required on most, if not all surveys, while there are many other items which may be required for the specific task to be performed. If your career takes you in a direction that specialises in a particular field, fresh produce for example, your "tool kit" may further expand with industry specific tools or equipment and items which for others may be "useful" will for you be "essential". The examples below should not be considered exhaustive but as a starting point and over time each surveyor will add to their tool kit the equipment that helps them to carry out instructions.

Essentials:
Note book, pens / pencils, camera with spare battery and memory card, tape measure, Personal Protective Equipment (Hi-viz, hard hat, safety footwear, gloves, goggles etc), silver nitrate solution, knife, marker pens, torch / flashlight.

Useful:
Spray paint, basic hand tools (screwdriver, hammer), step or collapsible ladder, heavy duty tape, hard hat torch, dust masks, disposable gloves, moisture meter, thermometer, sample bags.

1.3 - TERMS OF REFERENCE OR ENGAGEMENT.

The surveyor must understand the needs and priorities of the client. This should be discussed at the time of the instruction. Terms of reference (or of engagement) might place significant restrictions on the surveyor.

For instance, a client might instruct the surveyor that a particular warranty-compliance needs to be investigated and that if non-compliance is found, the insured should be advised, and the survey not continued with.

The insurer might also have some concerns about previous losses of a similar nature and require non-standard investigations to be made.

On a more positive note, the insurer might also have particular commercial considerations towards an insured, which require the surveyor to proceed to mitigate

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the loss and protect recovery rights, but to act on an assumption that the insurer wishes to reach a quick and amicable settlement of any claim. The negative corollary to that is that the insurer might want a strictly Without Prejudice (WP) and defensive approach to any claim.

If the surveyor is placed under any restrictions by terms of reference or engagement, then those restrictions should be communicated as clearly as possible to the assured and any other parties present at the survey and related discussions.

With the advent of the suing culture now prevalent, all instructions should be confirmed in writing (the contract) including a clause concerning the payment of the surveyor's fees.

1.4 - HEALTH AND SAFETY

General statement.

By the nature of the industry, the surveyor will often find themselves in potentially dangerous situations or circumstances and therefore health & safety is of paramount importance.

The Health & Safety Work Act 1974 places a legal statutory duty on employers to protect, provide and maintain equipment and systems of work that are safe and without risk to the health of employees, or others such us customers and members of the public who may be affected by their undertaking.

Employers, employees and stand-alone surveyors have a ***duty of care*** to those who may be affected by their actions or instructions.

Employers must have the following:-

- If you have five or more employees, you should have in place a written Health & Safety Policy, clearly stating who does what, when and where, which does not have to be too onerous. Remember, the HSE (Health & Safety Executive are on line to assist you in al H&S related issues www.hse.gov.uk.
- Have emergency procedures and display the health and safety law poster.
  Carry out risk assessments, for identifying sensible measures to eliminate and control any risks you might incur during your working day.

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- Measure and monitor Health and Safety.
- Have insurance.
- Provide Personal Protective Equipment (PPE).
- Provide for those with special needs.
- Control working hours.
- Provide regular health and safety training.

Responsibilities of the Employer

- Have a duty of care to all employees, contractors, and visitors and customers with whom they do business.
- Must ensure that their Health and Safety Officer carries out regular risk assessments of the workplace - and must act upon them.

Responsibilities of the Employee

- Point out and help to manage risks.
- Work in a safe manner.
- Never carry out a task you believe may be dangerous.
- Use any safety equipment provided and follow safety instructions.
- Know the Fire Warden and Health and Safety Officer.
- Know what to do in the event of a fire.
- Report accidents, even if they seem minor.

So why is health and Safety important? Because it affects you! If we are to make a difference and make the industry a safer place to work, we have to take responsibility to make it happen by eliminating or reducing risks by planning and controlling the obvious risk elements for ourselves.

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Identifying Hazards and Carrying out Risk Assessments

During the course of your career you will be instructed to attend at various locations including ports, warehouses, factories, construction sites, ships, lorries, private residences, all of which may pose differing risks and hazards.

- A Hazard is something that has potential to cause harm to someone.
- A Risk is the likelihood (high or low) of harm being caused.

The principles of Risk Assessment are based on common sense. Familiarity with the basis of the risk assessment and the mandatory completion of a Safe System of Work Assessment should form a natural part of a surveyor's day and equip them with the skills to deal effectively with identifying hazards.

Think about how accidents could happen and who might be harmed. Ask employees for their opinions on what they define as being a hazard and their findings on controlling these risks.

Once risks are identified you need to format a template for each risk and have measures in place to control and record your findings (refer to later examples of this guide for specific surveying risks and site inspections).

If you have less them five employees, this is not a requisite, but it is always good practice to keep records.

This process, once in place within any organisation can be used as a measure/monitor on levels of health and safety operations within the business. This foot print can also be applied to stand alone independent Surveyors.

Before Visiting Premises (i.e. warehouse, construction site, port, ship).

When you receive instructions to attend at a location, ensure you are in possession of the relevant information, can identify likely hazards and can carry out a risk assessment.

Risks identified may include the following.

- Travelling to and from site.
- Lone working.
- Condition of site.

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- Occupation of site.
- Environmental area.
- Personal risk.

The above points are by no means exhaustive and the extent to which any of the items might be relevant in particular circumstances will vary.

Arriving on Site / Leaving Site

Be aware that in certain ports, industrial sites, and construction sites, you may be asked to complete a 'Permit to Work' declaration and take part in their Health & Safely Induction/Tool Box Talks procedures prior to being allowed to commence your investigation/survey. Always follow the local regulations or instructions of the survey site and if you have any concerns then same should be raised with your host for their guidance.

Always ensure you have your Personal Protective Equipment (PPE), i.e. hard hat, safety boots, overalls, gloves, goggles etc., with you at all times as this will may be part of their site requisite. In any event, it is good practice to have your PPE wherever you attend and if you are going somewhere for the first time, check in advance of any specific requirements that the premises or location may have.

However well a survey or inspection is planned in advance, you need to be alert to potential hazards that are unknown until arrival at the survey location. This may arise simply through a general lack of information about the site, or because the condition of the property, its occupation, or other factors have changed unexpectedly.

Review the risk assessment as necessary and be alert during inspection to other hazards such as:

- Gangways.
- Work areas – operation of equipment such as fork lift trucks etc).
- Structures and Roofs.
- Timber and glass.
- Unsafe atmospheres (Entry into enclosed space procedures)
- Danger from live and unsecured services.

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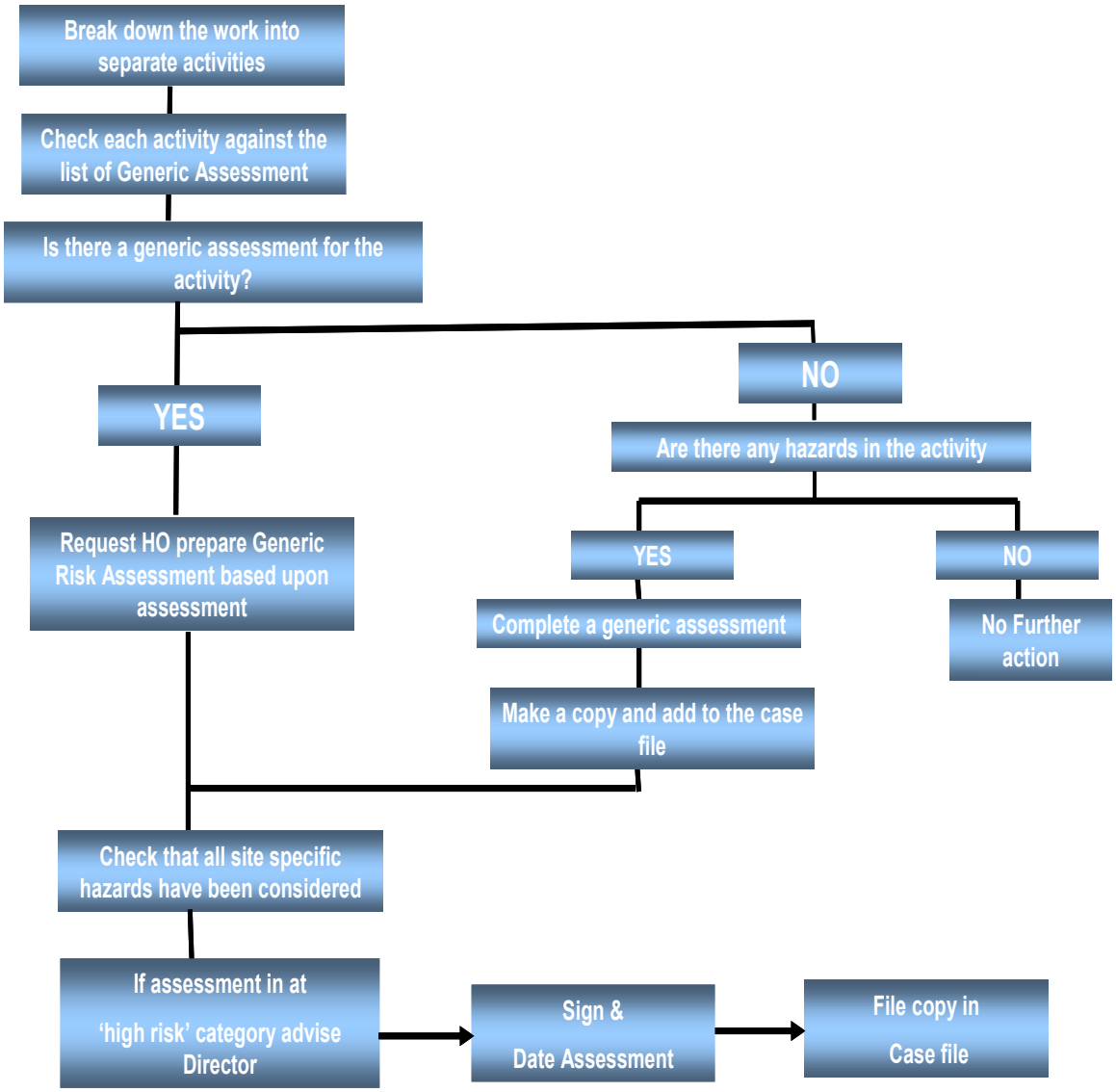
- Hidden traps, ducts and openings.
- Intruders and others.
- Contamination by rural environments or by vermin and birds.

The Principles of Risk Assessment: Flow Down Chart.

The principles of risk assessment are based on common sense. Familiarity with the basis of the Health and Safety generic risk assessments a Surveyor might encounter is key i.e. (a) the use of leaning ladders, (b) testing with silver nitrate, (c) manual handling, (d) working in confined spaces, (e) working in warehouses, (f) slips/trips and falls, (g) working at height, (h) working with containers, (i) working in dock areas, (j) PPE, (l) driving to work, (m) working on vessels, (n) working on constructions, (o) working with chemicals, (p) working with explosives, (q) working in factories or manufacturing areas, (r) alone working. The list is by no means complete and other risks may be identified during the course of your work.

Each risk must be identified, rated and documented (a) Identified common hazard risk analysis and (b) Residual risk rating after control measure. Having these measures in place to refer to will make the process a natural part of a surveying day, giving the Surveyor the skills to deal effectively with identifying hazards.

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<u>An example of the five steps to identify hazards.</u>

This following example covers a Generic Risk Assessment at a 'Salvage / Recovery Yard' *(Where a surveyor is involved in surveying commodities stored in a Salvage Yard).*

To reiterate, if you were on an industrial site ensure that the site 'Permit to Work' documentation has been completed and the site **Health & Safely Induction / Tool Box Talks** procedure have been carried out, if it is a requisite of the site prior to commencement of your task.

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Always ensure you have your **Personal Protective Equipment (PPE)** with you at all times, protective overalls and footwear, hard hat, gloves, glasses etc.

Forward Plan: If you're a company, your survey coordinator may have made the initial appointment relating to this instruction and relayed the details to you. However, if you are an independent surveyor you would need to be advised by your instructing Principal or ring the survey site. So you should have prior knowledge as the occupancy of the property and if there are any guard dogs on site. You will also be supplied with full contact details of who will meet you on site for you to gain access to undertake this survey.

Location: You should also be made fully aware of the items for survey they might be located in a fenced off yard with prefabricated building in situ.

STEP 1 : Identify the Hazards

Hazard 1.	Usually fenced off. Both yard and buildings on site could be storing various elements of stacked salvage items.
Resulting in:	The element of items falling on you should not be ignored.
Control Measure**:**	Review area you are entering ensuring you are safely away from items stored high. PPE should be worn whilst on site.
Hazard 2.	You may encounter on arrival an aggressive occupant/owner, ferocious guard dogs, owner's children, squatters, vagrants or rodents.
Resulting in:	Injury from angry occupant etc or being bitten by aggressive unsupervised guard dog. Any nesting rodents / pigeons would also pose a health hazard too.
Control Measures:	Survey coordinator to enquire regarding who will be present on arrival and if guard dogs are on site at premises, stay outside fenced parameter until person you are meeting appears. If person not there, prior to entering area make contact via your mobile with the number appraised by survey coordinator. Only

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go where you need on site, to undertake survey and be fully mindful of site infestations.

Hazard 3. Pre-fabricated building on site maybe damaged and in need of structural repair, which may render them unsafe.

Resulting in: Parts of building if in bad repair could collapse or tiles fall from roof.

Control Measures**:** Use of common sense, assess building on salvage premises prior to entering.

Hazard 4. Chemicals could be stored that you are unaware of.

Resulting in: Breathing problems, skin irritation, allergy to substances, being overcome by fumes.

Control Measures: Ask occupant if any chemicals could be stored on the premises and if there are any suspicious looking containers do not enter or approach.

Hazard 5. No defined walkways.

Resulting in: Slips, trips and falls could occur due to uneven surfaces, kerbs, steps etc.

Control Measures: Be aware of any spillage on site dry or wet, uneven surfaces, misc. rubbish, trailing cables, etc.

Hazard 6. Vehicles maybe on site e.g. fork lift trucks, cherry pickers and owner's car.

Resulting in: Being struck by vehicle movement / reversing / toppling over on site.

Control Measures**:** Stay alert and be fully aware of your surroundings, listen out for audible reversing alarms around your working area. It is important to keep to marked pedestrian walkways.

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Hazard 7. You may be required to use or work near a ladder.

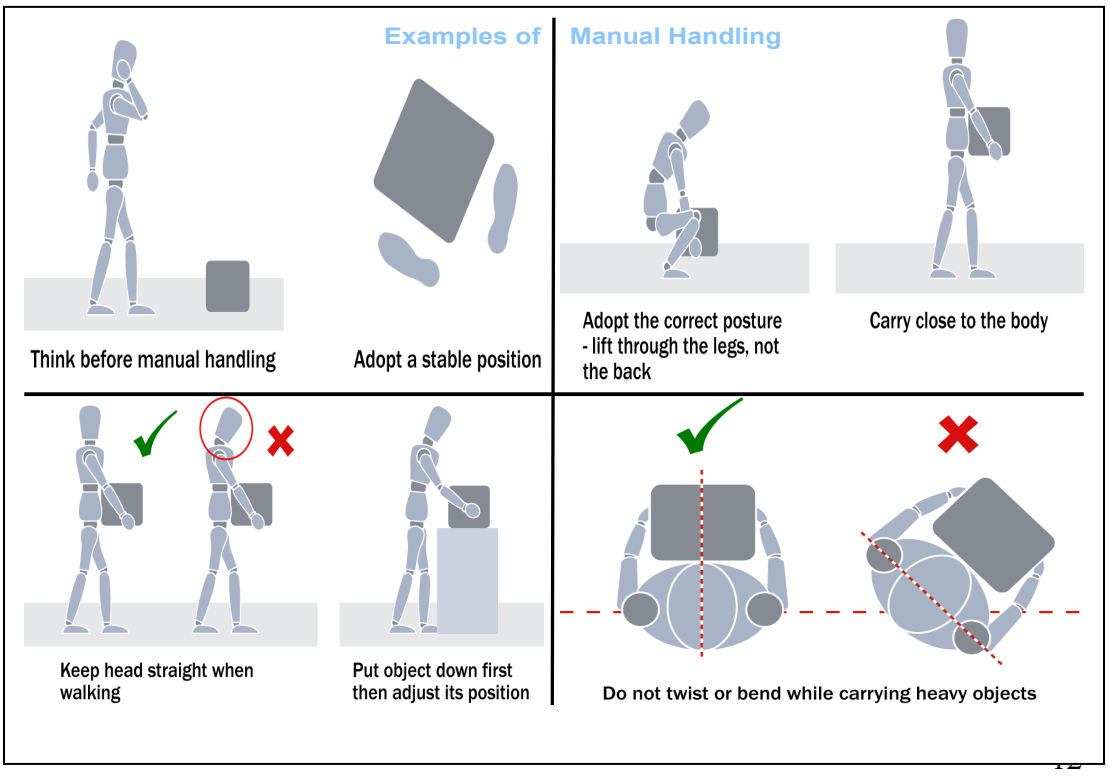
Resulting in: Fall of items/person from overhead working or fall from ladder whilst undertaking survey.

Control Measures: Prior to ascending ensure ground position are firm, ladder is tied ensuring stability, ladder is level and stable, do not overreach.

Hazard 8 Manual handling.

Resulting in: Could cause musculoskeletal disorders caused by lifting objects or constraints on posture when moving items.

Control Measures: If you cannot avoid lifting an item (e.g. pushing or make the load lighter) then adopt a stable position with your head held high and look ahead. Reduce the amount of twisting and stooping especially whilst back is bent and remove any obstacles in your way. Keep the load as close to your body for as long as possible whilst lifting. Avoid handling the item several times. Consider the use of a mechanical aid and improve lightening conditions if possible?



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STEP 2 : Decide who could be harmed and how (as defined in Step 1)

- Surveyor
- Other people on site e.g. Occupants.

STEP 3 : Evaluate the risk and decide on control measures (as outlined above Item 1)

Having identified the Hazards, you have to decide what to do about them. The Law requires you to do everything 'reasonably practicable' to protect people from harm. Compare what you are doing with good practice. Think about what you are already doing, think about controls you have in place and how the work is organised. Then compare with 'good practice' and ascertain if there is more that you could do e.g.
Can we get rid of this hazard altogether, (b) if not how can we control the risk so that harm is unlikely. When compiling risks apply the principles detailed below, in the following order:

- Try a less risky option
- Prevent access to the hazard
- Organise work to reduce exposure to the hazard (e.g. barriers between pedestrians and traffic)
- Issue Personal Protective Clothing (PPE) to be worn whilst on site
- Provide welfare facilities (e.g. first aid and hand washing for removal of any contamination)
- The likely severity of injury if an accident were to happen, for example a slipped disc might be an outcome of a manual handling injury
- The probability that an accident was going to occur
- The duration and frequency of exposure to each hazard

Control measures should be evaluated and documented to assess their effectiveness. Training could be given; these may be things such as manual handling training, supervision, mechanical aids etc.

The law should be considered to see if more needs to be done. The relevant laws, and recommended reading are:

- The Health & Safety at Work Act 1974.
- Management of Health & Safety at Work Regulations 1999.

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- Workplace Health, Safety and Welfare Regulations 1992.
- Working at Height Regulations 2005,
- Line Operations & Lifting Equipment Regulations 1998.
- Manual Handling Operations Regulations 1992.
- Working in Confined Spaces Regulations 1997.
- Personal Protective Equipment at Work Regulations 1992.

STEP : 4-Record your finding and implement them

The significant findings of the risk assessment should be recorded and information on these findings should be documented and provided to employees.

No risk assessment will ever be perfect, but it must be suitable and sufficient and show:

- A proper check was made
- You stated who might be affected
- You dealt with all the significant hazards, taking into account the number of people who could be involved
- Once you have identified the risk and that the control measures in place are reasonable, re-rate the risk and;
- Ensure you involved your employees and their representatives in the process

STEP : 5-Review your assessment and update if necessary

Nothing stays the same, therefore, risks should be reviewed on an ongoing basis:

- Set a 'Review Date' for what you are doing on an annual basis
- Ensure Risk Assessments in place are kept updated
- Can risk assessment be improved or removed
- Has employee spotted a new problem area that needs to be addressed

Finally, the surveyor must ensure before visiting the premises that he has read and understood the relevant generic risk assessment provided for this task.

Monitoring accidents and ill health.

Under Health and Safety law, you must report and keep records of certain injuries, incidents and case of work-related disease. If you have more than ten employees you must keep an accident book under social security law. Accident and ill-health at work

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are reported under RIDDOR (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations) www.hse.gov.uk/riddor.

If you employ anyone, you must display the Health and Safety law poster where employees can easily read it. The poster outlines British Health and Safety Law informing employers and employees what they need to do. The new version of the poster was published in 2009 and reprinted in 2018 with enhanced security features.

You must be able to show that you are monitoring and measuring Health & Safety. Keeping records will help to identify patterns of accidents and injuries and will also help when completing your risk assessments. Your insurance company may also want to review your records if there is a work-related claim.

Keep your business updated.

You will need to review your health and safety policy and risk assessments regularly and make sure that all your employees understand their roles and responsibilities.

http://legislation.gov.uk carries most types of UK Legislation. Follow Health & Safety news and events to keep policy and risk assessments up to date. You can access HSE online news to assist you in this goal.

Appendix: 1 - Template for a Health & Safety Policy
Appendix: 2 - Template for a Generic Risk Assessment

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Health and safety policy

This is the statement of general policy and arrangements for:	(Name of company)
Overall and final responsibility for health and safety is that of:	(Name of employer)
Day-to-day responsibility for ensuring this policy is put into practice is delegated to:	

Statement of general policy	**Responsibility of: Name/Title**	**Action/Arrangements** (customise to meet your own situation)
To prevent accidents and cases of work-related ill health and provide adequate control of health and safety risks arising from work activities.		
To provide adequate training to ensure employees are competent to do their work.		
To engage and consult with employees on day-to-day health and safety conditions and provide advice and supervision on occupational health.		
To implement emergency procedures – evacuation in case of fire or other significant incident. You can find help with your fire risk assessment at: http://www.communities.gov.uk/fire/firesafety/firesafetylaw/.		
To maintain safe and healthy working conditions, provide and maintain plant, equipment and machinery, and ensure safe storage/use of substances.		

Health and safety law poster is displayed:				
First-aid box and accident book are located: Accidents and ill health at work reported under RIDDOR: (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations) www.hse.gov.uk/riddor Tel: 0845 300 9923				
Signed: (Employer)		Date:		
Subject to review, monitoring and revision by:		Every:		months or sooner if work activity changes

Employers with five or more employees must have a written health and safety policy and risk assessment.
For further information and to view our example health and safety policy go to www.hse.gov.uk/risk
For advice and support contact HSE Infoline Tel: 0845 345 0055 or e-mail: hse.infoline@connaught.plc.uk
Combined risk assessment and policy template published by the Health and Safety Executive 09/06

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Risk assessment

All employers must conduct a risk assessment. Employers with five or more employees have to record the significant findings of their risk assessment.

We have started off the risk assessment for you by including a sample entry for a common hazard to illustrate what is expected (the sample entry is taken from an office-based business). Look at how this might apply to your business, continue by identifying the hazards that are the real priorities in your case and complete the table to suit.
You can print and save this template so you can easily review and update the information as and when required. You may find our example risk assessments a useful guide (www.hse.gov.uk/risk/casestudies). Simply choose the example closest to your business.

Company name:

What are the hazards?	Who might be harmed and how?	What are you already doing?	What further action is necessary?	Action by who?	Action by when?	Done
Slips and trips	Staff and visitors may be injured if they trip over objects or slip on spillages.	General good housekeeping. All areas well lit, including stairs. No trailing leads or cables. Staff keep work areas clear, e.g. no boxes left in walkways, deliveries stored immediately, offices cleaned each evening	Better housekeeping needed in staff kitchen, e.g. on spills.	All staff, supervisor to monitor.	01/10/2010	01/10/10
						Hint, tab here for new row

Assessment review date: (usually within one year, or earlier if working habits or conditions change)

For information specific to your industry please go to www.hse.gov.uk.

Employers with five or more employees must have a written health and safety policy and risk assessment.
For further information and to view our example risk assessments go to www.hse.gov.uk/risk.
For advice and support contact HSE Infoline Tel: 0845 345 0055 or e-mail: hse.infoline@connaught.plc.uk.
Combined risk assessment and policy template published by the Health and Safety Executive 09/09

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Working in confined spaces (land based).

Unfortunately, despite widespread publicity, fatalities still occur in confined spaces. These include vessel's holds (on occasions carrying oxygen depleting cargo i.e. timber or rusting steel) and both ship and shore tanks.

A confined space is an enclosed or partly enclosed space that has other features that combine to make it potentially dangerous to work in. For example, it's hard to get in and out of, and it may have low oxygen levels, or contain harmful fumes. It may store something that could crush or suffocate, like sand or grain.

Examples of potential confined spaces:

- storage tanks, tank cars
- process vessels, pressure vessels
- silos
- pits and degreasers
- pipes, sewers, sewer pump stations
- wet and dry wells, shafts and tunnels

Risks of working in confined spaces.

There are serious health and safety risks working in confined spaces. For example:

- loss of consciousness, injury or death from contaminants in the air
- a fire or explosion that kills or seriously injures
- suffocation from oxygen deficiency
- crushing or suffocation from something like grain, sand, flour or fertiliser if you fall into it

Incidents in confined spaces have sometimes involved multiple deaths. Other workers enter a space to rescue a victim, unaware of the risks. But they can also be overcome by toxic fumes or gases.

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Managing safety in confined spaces

The Confined spaces compliance guide (need to include a link if available) has information to help you check if you have any confined spaces, and contains details about hazards, risks and controls.

If you have enclosed spaces that aren't technically confined spaces, they can still be dangerous. For example, you should evaluate the safety of using an LPG forklift in an enclosed cool storeroom.

Find the hazards.

If you have a confined space, you must identify all the hazards associated with work in that space. This might include things like ignition hazards from open flames, and environmental hazards like heat or damp.

Assess the risks

Once you have identified the hazards, you must assess the risks associated with the hazards.

Testing the atmosphere helps you know what hazards are present so you can control the risks in the confined space. It tells you oxygen levels, and if there are air contaminants, flammable gases or vapours. Testing is important because many toxic gases cannot be seen or detected.

Control risks

The best solution is to eliminate the risk by finding a way to do the work without entering the space. For example, you might be able to clean a tank with a high-pressure hose through the hatch.

If it is not possible to do the work from outside, look at ways to reduce the risk. For example, you could scrape the surface of a tank instead of using chemicals or replace a flammable solvent with a non-flammable one.

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Review risk controls

Review your risk controls to make sure they are working properly. You must review and, if needed revise them if, for example:

- a notifiable incident occurs
- the risk controls do not control the risk effectively
- an HSR requests.

Legal duties

For further information, please refer to the following website.

http://www.hse.gov.uk/confinedspace/legislation.htm

Working in confined spaces on-board vessels.

The following are extracts from the Code of Safe Working Practices for Merchant Seafarers (COSWP 2024) and apply to heath and safety on board ships.

An enclosed space is defined in the regulations (at 15.1.1) as one that is not designed for continuous worker occupancy and has either or both of the following characteristics:

- limited openings for entry and exit
- inadequate ventilation

The Shipping company must have procedures in place for entering and working in dangerous spaces, and it is the master's responsibility to ensure these are followed. No person should enter or remain in a dangerous space unless they are trained to do so and follow the set procedures.

An extract of this Code which provides detailed information on the procedures for entry into dangerous spaces is detailed below.

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Examples of such spaces are: cargo spaces; double bottoms; fuel tanks; ballast tanks; cargo pump rooms; cargo compressor rooms; cofferdams; chain lockers; void spaces; duct keels; inter-barrier spaces; boilers; engine crankcases; engine scavenge air receivers; CO2 rooms; battery lockers; sewage tanks; and adjacent connected spaces, e.g. cargo space access ways.

This is not an exhaustive list, and awareness of potential risks is necessary for all spaces on board ship. If in any doubt, any such space should be regarded as dangerous and appropriate action taken.

In addition: if there is any unexpected reduction in or loss of the means of ventilating spaces that are usually continuously or adequately ventilated, such spaces should also be dealt with as dangerous spaces; and when it is suspected that there could be a deficiency of oxygen in any space, or that toxic gases, vapours or fumes could be present, then such a space should be considered to be dangerous.

Entrances to all unattended dangerous spaces on a ship should be kept locked or secured against entry. Any hatches to readily accessible enclosed spaces should be marked as the entrance to a dangerous space. When the space is open for work to be carried out, an attendant should be posted or a barrier and warning sign put in place. As far as possible, work should be arranged in such a way that no one has to enter the space.

If you don't have to enter an enclosed space to do your job, then don't enter it!

1.5 - MARINE INSURANCE TERMINOLOGY

Act of God

A natural event such as flood, storm, lightning, or earthquake not caused by nor preventable by any human agency, and for which no carrier can usually be held accountable.

Adventure

The commercial enterprise involving uncertainties, risks, and hazards, in which a vessel and cargo are subjected to the peril of a loss, delay or damage at sea. Merchandise is shipped by the seller on speculation to arrive safely at a foreign port to be sold for a

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profit. The vessel carries the merchandise in order to earn freight. The vessel and cargo together make up the "common venture." In clipper ship days, the captain participated in the profits of the venture to give him the incentive to make profitable voyages for the owners. Fishing vessel owners still give their crew "shares" of the venture's profits.

All Risks

The broadest form of insurance coverage available, providing protection against all perils of physical loss or damage from an external cause. Loss must be fortuitous, i.e. accidental, to be covered. All risks does not cover inevitable loss, wear and tear, delay, inherent vice, pre-shipment condition, inadequate packaging, or loss of market.

Approved Merchandise

Under an Open Cargo Policy, goods that are approved by the insurance company for coverage under the specified insuring conditions and rates of the policy. Other goods can be "held covered," but subject to terms and conditions to be determined.

Approved Packing

Packaging that meets the packaging industry standards of sufficient design and construction to protect the cargo from the normal hazards expected to be encountered during the intended voyage, including normal domestic handling and storage from point of origin to final destination.

Approved Vessel

A specification in the insurance policy of the minimum vessel-type that the insurer accepts for the carriage of the insured cargo without additional premium. Shipments aboard other vessels are accepted and may be subject to additional premiums.

Average

Any loss or damage to a vessel or cargo that is due to an insured peril and is less than a total loss.

Clean Bill of Lading

A bill of lading without notation of damage exceptions to the cargo or the packing. A clean B/L is prima facie (at first sight) evidence of the apparent good order and condition of the cargo when received by and accepted for carriage by the carrier.

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Blocking and Bracing or Dunnage
Materials (usually wood-timber) used to secure, immobilize and protect cargo by preventing its free movement or shifting during transit.

Carnet
An international customs document, acting as a passport for merchandise that allows goods to temporarily enter certain foreign countries and return without paying duty or posting customs bonds in either country; e.g. goods for trade shows, display, or demonstration.

Certificate Of Insurance
In Marine Insurance, a document issued on behalf of an insurance company covering a specific shipment. It states the terms and conditions of the cargo insurance and is subject to the terms and conditions of the underlying open cargo policy. It is not a "stand-alone" policy. It is used when evidence of insurance is required, especially by a bank issuing a letter of credit.

Classification Societies
Organizations which survey and classify ships according to their condition for insurance and other purposes; e.g. Lloyd's Register of Shipping (England), American Bureau of Shipping (ABS- United States), Bureau Veritas (Norway).

Contingency Insurance – Sellers interest
Backup insurance that protects a party's interest if certain events occur, e.g. if the Assured buys or sells cargo on terms under which the insurance is arranged by the other party, and that insurance fails to respond to a covered loss, the Contingency Insurance protects the Assured's interest in the shipment.

Declaration
An insurance form filled out by the Assured for reporting / declaring individual shipments for cover under an Open Cargo Policy. It is usually used for declaring import shipments where evidence of insurance is not required. A multi-entry declaration is called a bordereau.

Deductible / Deductible Average (DA)
Either a percentage of the insured value of the entire vessel or the entire cargo shipment, or a specified amount which is subtracted from the total amount of claim. It is applied to partial loss claims, but not usually to total loss or General Average claims, depending on the policy wording.

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Force Majeure Clause
A clause in a contract exempting the parties from their obligations under the contract as a result of conditions beyond their control.

General Average (G A)
An ancient principle of equity, recognized by maritime nations, pre-dating the concept of insurance and still valid today, in which all parties involved in a sea adventure (vessel, cargo, and freight) proportionately share losses resulting from a voluntary and successful effort to save the entire venture from an imminent peril. There are two types of General Average acts:

1. Voluntary Sacrifice of a part of the vessel or a part of the cargo, e.g. jettison of property to stabilize the vessel during heavy weather.
2. Extraordinary Expense necessarily incurred for the joint benefit of vessel and cargo, e.g. towing charges incurred to assist a disabled vessel to a port of refuge.

General Average Guarantee
A guarantee by the owner of the cargo (usually the consignee) to pay that proportion of the general average contribution, salvage, or special charges owed by the shipment, and to give information about its value so an Average Adjustment can be prepared. The vessel owner will not release cargo for delivery to the consignee until the cargo owner signs this average agreement or bond, which is prepared by the general average adjuster.

Inherent Vice
A loss caused by the nature of the thing insured and not the result of a fortuitous external cause; e.g. spontaneous combustion of bulk grain or fruit rotting due to age.

Institute Clauses
Clauses agreed in the London insurance market and offered by the Institute of London Underwriters. (Clauses offered by the American market are titled "American Institute of Marine Underwriters Clauses.")

Insurable Interest
A real stake in a specific property to the extent that loss of or damage to the property could cause a financial loss.

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Letter Of Credit (LC) (LOC)
A document issued by a bank and used to pay for cargo. The buyer arranges a letter of credit from its local bank, creating a fund in a foreign bank near the seller in a specified amount in the seller's favor. The buyer authorizes the seller to draw drafts against the fund for goods purchased by the buyer. A sum of money is paid to the seller under specific terms and conditions, including the receipt by the bank of certain documents within a given time.

Loss Of Market
A reduction in the value of merchandise for reasons other than physical damage - either late arrival or obsolescence; e.g. Christmas trees arriving undamaged in January. This is a "business loss" and is not recoverable under a Marine Cargo Policy.

Master's Protest (or Note of Protest or Sea Protest).

1. Sworn statement of the captain describing any unusual happening during the voyage, and disclaiming vessel responsibility for it.
2. Accident report submitted by the captain on a hull claim.

Named Perils Policy
Any marine policy limiting coverage to perils specifically listed in the policy; as opposed to an All Risks policy.

Negligence
Doing something that a reasonable and prudent person would not do, or not doing something that a reasonable and prudent person would do in a particular situation. The failure to exercise normal care or act reasonably under the circumstances.

Non-Delivery
A loss in which an entire shipping package and its contents are missing at destination. Non-delivery does not include pilferage of cargo from a package where the package itself is delivered.

On Deck Cargo
Cargo carried on the main deck of the vessel, or other spaces above the main deck; cargo carried on deck maybe subject to damage by wind, sea water, and being washed overboard.

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Open Policy
A cargo policy with no expiration date that provides automatic coverage of cargo shipments to or from an Assured in a specified trade at agreed rates, terms, and conditions. The marine and war policies are usually two separate open policies.

Partial Loss
Any loss to cargo or a vessel that is less than a total loss. If the partial loss is directly caused by a peril insured against, it is a particular average loss.

Particular Average (PA)
A partial loss of the property insured (vessel or cargo, including total loss of part of a cargo shipment) caused by a peril insured against, and which is not a General Average loss.

Pilferage
The theft of part or all of the contents from a shipping package where the package itself is delivered at destination.

Recovery
Amount received from a third party responsible for a loss on which a claim has been paid.

Risk
A fortuitous peril or hazard; i.e. something that may happen, not something that is inevitable.

Sacrifice
The deliberate destruction or jettisoning of property to prevent greater loss.

Settling Agent
An insurance company's representative in a foreign country who is authorized to settle claims and make payment on behalf of the insurance company.

Special Drawing Rights (SDR)
An international monetary unit used to measure and compare the changing market values of currencies of member countries of the International Monetary Fund ("IMF"). The value of an SDR is based on a basket of international currencies reviewed by the IMF every five years.

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SR&CC Warranty (Strikes, Riots & Civil Commotions)
A clause in marine insurance policies that excludes liability for losses caused by the acts of strikers, locked-out workers, or persons taking part in labour disturbances or riots or civil commotions or for losses which are directly caused by persons acting maliciously. This coverage may be restored to the policy by means of the SR&CC Endorsement, for an additional premium.

Total Loss Only (TLO)
An insurance policy covering ONLY the total loss of an entire vessel, an entire cargo shipment, or other property from an insured peril. A partial loss, even from an insured peril, is NOT covered by the Total Loss Only policy.

Valuation Clause
The clause in the Marine Policy that contains a consistent basis of valuation agreed upon by the Assured and the insurance company and which establishes the insured value of the cargo or vessel when the insurance attaches.

Warehouse To Warehouse Clause (known as the Transit Clause at Clause 8 of the Institute Cargo Clauses)
A clause in a cargo policy defining when coverage attaches and terminates.
Coverage attaches when the cargo leaves the warehouse at the place named in the policy and continues during the ordinary course of transit after discharge at the final port. Coverage ends when one of the following first occurs:

- When the cargo is unloaded from the carrying vehicle or conveyance in or at the final warehouse or place of storage at the destination named in the contract of insurance
- On completion of unloading from the carrying vehicle or other conveyance in or at any other warehouse or place of storage, whether prior to or at the destination named in the contract of insurance, which the Assured or their employees elect to use either for storage other than in the ordinary course of transit or for allocation or distribution
- When the Assured or their employees elect to use any carrying vehicle or other conveyance or any container for storage other than in the ordinary course of transit or
- On the expiry of 60 days after completion of discharge overside of the subject matter Insured from the oversea vessel at the port of discharge,

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Warranty

An undertaking in which the Assured promises to comply with certain conditions. By virtue of the Insurance Act 2015, a breach of warranty no longer terminates the insurer's liability from the date of the breach, rather, it suspends the insurer's liability until the breach is remedied. Where the breach is remedied before a loss, the insurer is liable to pay the claim.

Express Warranty - An express warranty refers to specific conditions or clauses clearly written in insurance documents.

Implied Warranty – An implied warranty is a guarantee that is automatically understood to exist as part of the agreement between the Insured and the Insurer. For instance, the Marine Insurance Act 1906 implies warranties such as:

1. Seaworthiness of the vessel (Section 39); and
2. Legality of the adventure (Section 41).

War Risks

Those risks related to two (or more) belligerents engaging in hostilities, whether or not there has been a formal declaration of war. Such risks are excluded by the F.C. & S. (Free of Capture and Seizure) Warranty but may be covered by a separate War Risk Policy, at an additional premium.

Wear & Tear

The ordinary wearing away of the various parts of a vessel, machinery, and equipment through use. Such damage is not accidental in nature but is inevitable.

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1.6 – DOCUMENTATION AND PUBLICATIONS.

Candidates should have a full understanding of the following publications.

- Code of Safe Practice for Cargo Stowage and Securing, (CSS Code), 2021.
- Code of Safe Practice for Ship's carrying Timber Deck Cargoes, (TDC Code) 2011.
- Code of Practice for packing of Cargo Transport Units (CTU Code), 2014.
- International Maritime Dangerous Goods code (IMDG Code), 2022.
- International Maritime Solid Bulk Cargoes Code (IMSBC Code), 2022.
- Guide to Maritime Security and ISPS Code, 2021.
- Bulk Cargo Loading and Unloading code (BLU Code). 2011.
- Code of safe practice for Merchant Seamen (COSWP), 2024.
- Lloyd's Survey Handbook, 1999.

Candidates should also have a full understanding of the following documents and understand their relevance and be aware of their terms and conditions:

- Commercial Invoice and Incoterms i.e. CIF, FOB, etc.
- Bill of Lading
- CMR Note
- Air Waybill
- Packing List
- Delivery Note
- Collection Note
- Outturn Report
- Certificate of Origin
- Phytosanitary Certificate
- Letters of Indemnity
- Note of Protest
- Letters of Undertaking

1.7 - INCOTERMS.

With the majority of shipments there will be a commercial invoice which will detail the goods shipped and the terms of sale. This shows the currency of sale and at what point ownership transfers. The main terms – as defined by the INCOTERMS 2020 - are as below:

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ANY MODE OF TRANSPORT:

EXW: **EX**-**W**orks: The buyer is responsible for all the cost and risk of bringing the cargo from the shipper's premises. Risk and title transfers on handover of the goods before the start of the voyage.

FCA: **F**ree **CA**rrier: The seller is responsible for delivery to the custody of the carrier (i.e. loading onto the conveying vehicle). The buyer is responsible for arranging transportation with title and risk transferring when the goods are placed onto the vehicle.

CPT: **C**arriage **P**aid **T**o: The seller is responsible for delivery to the custody of the carrier and pays for transport to the named destination. Risk transfers to the buyer at the point of collection. Buyer needs to arrange insurance.

CIP: **C**arriage & **I**nsurance **P**aid to: The seller is responsible for delivery to the custody of the carrier and pays for transport and insurance to the named destination. Risk transfers to the buyer at the point of collection.

DAP: **D**elivered **A**t **P**lace: The seller delivers the goods to the disposal of the buyer on the arriving means of transport at the agreed place. Seller assumes the risk, transport and insurance costs until the goods are made ready for unloading.

DPU: **D**elivered at **P**lace **U**nloaded: The seller delivers the goods and unloads from the arriving means of transport at the agreed place. Seller assumes the risk, transport and insurance costs until the goods are placed in situ.

DDP: **D**elivered **D**uty **P**aid: Seller bears cost, risk and responsibility for cleared goods at named place of destination at buyers disposal. Buyer is responsible for unloading. Seller is responsible for import clearance, duties and taxes so buyer is not "importer of record".

SEA & INLAND WATERWAYS:

FAS: **F**ree **A**longside **S**hip: Risk passes to buyer, including payment of all transportation and insurance costs, once delivered alongside the ship (realistically at named port terminal) by the seller. The export clearance obligation rests with the seller.

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FOB: **F**ree **O**n **B**oard: Risk passes to buyer, including payment of all transportation and insurance costs, once delivered on board the ship by the seller. A step further than FAS. The buyer and seller might also reach agreements on who will lash and secure the cargo, as this is not included in the default obligations of the seller

CFR: **C**ost & **FR**eight: Seller delivers goods to a named port of destination and risk passes to buyer when on board the vessel. Seller arranges and pays cost of freight to the named destination port. A step further than FOB.

CIF: **C**ost **I**nsurance & **F**reight: Seller delivers goods and risk passes to buyer when on board the vessel. Seller arranges and pays cost of freight and insurance to the named destination port.

The 2020 version of INCOTERMS resolved a number of anomalies in previous versions, where terms that were designed to regulate the sale of goods shipped by sea, were being used for air, road and multimodal shipments. This resulted in confusion and legal uncertainty, so the 2020 version states terms that MUST ONLY be used for ocean carriage and those terms that are suitable for other modes of carriage.

Candidates will be expected to show a clear understanding of the basic obligations of the shipper and seller in the main INCOTERMS as well as the risk/title transfer points. The official guide, can be bought in hardcopy or downloaded from the International Chambers of Commerce bookstore at http://www.iccbooks.com

PART 2. GENERAL CARGOES.

2.1 - IDENTIFICATION

It sounds obvious, but an essential aspect of survey is the proper identification of the goods under review.

Nearly all cargoes of a dry nature are marked in some way. This marking varies very considerably from an address stencilled onto the wrappings, boxes or crates to more complex signs. In addition, manufactured goods will carry model and serial numbers plates.

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These marks and numbers must form part of a surveyor's note taking and should be cross-referenced to the shipping documents to verify that what you are looking at is what you are instructed to look at and also that you have looked at everything you were instructed to. Many of us have experienced the shock of realisation that we spend time looking at the wrong goods, or that we did not see the whole of our cargo.

While it is not possible to mark a bulk liquid cargo, identification is normally by tank number/position and can also be cross-referenced to the documents and to the ship's stowage plan.

In the case of a road vehicle, the trailer number, cross-referenced to the shipping documents, can provide the necessary identification. All surveyors must be certain of proper identification at the time of survey – recording a full description of the marks and references in the notes and taking photographs to back this up.

2.2 - TYPES OF SURVEY

Damage Surveys.

Due to the variety and size of this subject it is not practical to enter into detail and reference should be made to Lloyds' Survey Handbook (7th Edition, 1999), Thomas' Stowage (8th Edition, 2018), or by reference to various cargo related internet sites.

The purpose of such surveys, however, is to establish the cause of damage or loss. This might be readily apparent i.e. pilferage, water damage or impact damage, but might require the services of experts such as forensic chemists, metallurgist, etc.

Damage to temperature-controlled cargos such as fresh fruit, vegetables, meat, pharmaceuticals and packaged food products can occur as a result of problems with the refrigeration equipment and, once again, it is important for the surveyor to determine cause, quantum and take all steps necessary to mitigate the loss.

Pre-shipment or Packaging Surveys

Such surveys might require the inspection of goods i.e. machinery, commodities, produce, etc, prior to shipment and the surveyor should ensure that he has the necessary qualifications to carry out the task and be aware of his principals' specific

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requirements: are they interested only in quantity and outward appearance or do they require a functional test of machinery or quality-assessment of commodities.

These surveys may be required where letters of credit or guarantees are to be issued and failure to properly investigate and report could lead to large financial losses and severe liabilities on the surveyor.

In some instances, the surveyor may only be asked to carry out an external inspection of the goods prior to packing to identify the goods, record serial numbers where required and comment on condition.

In other cases, it may be necessary to carry out a packing inspection to ensure that the goods are adequately packed for the transit involved. Ideally the surveyor should be involved prior to commencement of packing and in respect of specialist machinery the surveyor should be consulted and his opinion and guidance sought in the design of the packing. The surveyor would normally attend at the time of packing at which point he can ensure that the equipment/goods are adequately packed taking into account the likely rigours of transit to be encountered.

The surveyor should ensure that each package is clearly marked with the shippers/consignee's details, weight, measurements, etc, and if the consignment is of a hazardous nature the appropriate IMDG labels and any essential handling instructions such as "This way Up", "Fragile", centre-of-gravity and safe slinging or lifting points

On specialist equipment Shock Watch, Tip N' Tell devices, or accelerometers should be affixed and witnessed by the surveyor. Temperature-controlled cargos should have electronic temperature recorders i.e. Temptale recorders, checked, started and positioned by the surveyor.

Loading Surveys.

The loading survey follows on from the pre-shipment/packaging survey in that the surveyor may be instructed to attend at the vessel/aircraft/lorry or any other mode of transit to witness the loading and securing of the consignment/s. This may involve inspecting the vessel/aircraft/lorry to ensure that same is suitable for the task and that the proposed method of securing and bracing of the goods are adequate taking into account the guidance in relevant publications i.e.CSS Code, 2011.

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The surveyor should ensure the following:

- Suitability of the packing.
- The equipment utilised to carry out the loading, whether it be a small forklift truck or heavy lift crane, is adequate in terms of certification, safe working loads, breaking strains, etc, and the personnel operating the equipment are fully qualified.
- The container, trailer, rail wagon or vessel are cargo worthy e.g. checks should be undertaken to ensure that the units and, in respect of vessels the hatch covers, are weather tight (inspection of seals, hose tests, ultrasonic testing).
- During loading the surveyor should ensure that the cargo is correctly stowed, positioned, and secured taking into account the likely weather conditions and rigours to be encountered during the transit or sea voyage.
- When loading to a vessel, the stability at the time of loading and anticipated stability at the time of arrival at destination port should be checked and the surveyor or someone suitably qualified (Master Mariner or Naval Architect) should sight the stability calculations to ensure that they are correct.
- The stability of a vessel is indicated by its metacentric height (expressed as GM) and the higher the figure, the more stable the vessel but this could lead to what is termed a 'stiff' ship resulting in more violent rolling. A low figure results in more subdued rolling but less stability and so an adequate GM for the cargo is therefore preferable. This will vary from ship to ship and suitably qualified surveyors with experience and/or with a marine background will be able to determine what is 'adequate'.
- On large project cargo equipment shipments, loading and securing plans may already have been compiled by a specialist taking into account the physical properties of the piece together with the conditions to be expected during the transit. In these instances, the surveyor would be required to ensure that the project equipment is loaded and secured in accordance with the plan. In the absence of any securing plan the surveyor would have to use his knowledge and expertise, together with reference to various publications and guidelines (i.e. CSS Code, Annex 13), to ensure that the piece was adequately secured with chains, wires, span sets, chocks, dunnage, etc.

There are various publications which should be reviewed by the surveyor and provide guidance for the stowage and securing of cargoes, for example:

- Lashing and securing of Deck Cargoes (Nautical Institute), Author John Knott.
- Code of Safe Practice for Cargo Stowage and Securing (CSS Code 2021).

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Allianz/UK P & I Club publications. 'Guidance on how to safely load, stow, secure and discharge heavy lifts and project cargoes' https://maritimesafetyinnovationlab.org/wp-content/uploads/2015/11/uk-pandi-project_cargo_matters.pdf

Draught Surveys.

The surveyor is required to calculate the loaded (cargo full) and light condition (no cargo) or vice versa to determine the weight of cargo loaded on board.

Whilst this can be calculated for any vessel, it usually applies to vessels carrying bulk cargoes irrespective of size. The figures obtained by the surveyor are used for bill of lading or invoice purposes and have to be as accurate as possible.

The accuracy of the draught survey depends on the conditions in which it is undertaken. Draughts have to be taken, forward, midships and aft both sides and still water conditions are ideal. Should there be a swell or even a slight wind chop, then the accuracy of these draughts will reduce.

Once the draughts have been obtained, soundings of all tanks has to be carried out to determine how much water/oil/ballast/slops are on board.

Armed with this information the surveyor then calculates the weight of the ship using the vessels stability information before and after loading to determine the weight.

The calculations are complex although there are now computer programmes available which will assist. The surveyor, however, should be fully confident in his abilities to carry out the above task.

BACS reminds all surveyors and candidates that loading and draught surveys are specialised activities. All surveyors should be familiar with the basic principles of these surveys but should not accept any instruction for which they are not suitably qualified and experienced.

Risk Assessments.

Experienced BACS Surveyors might be called upon to undertake a risk assessment of a business, prior to or as a condition of cover being granted by an underwriter.

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The ability effectively to perform these assessments is something derived from a wide experience of loss and damage investigation, but also requires some expert knowledge of construction principles, engineering of racking and other storage systems, installation and operation of alarm systems (fire and intruder alarms) and fire suppression systems.

For the purpose of the BACS examination, candidates should have an awareness of the issues that are of concern to cargo underwriters and the content of Pre-Risk Reports.

The insured business:

- What do they do?
- How long have they traded?
- What is their annual turnover?
- Who are the directors?
- Are they part of a group of companies, what are the other related business interests?

It is important to consider and report a summary of these facts so that the underwriter can be sure that the business matches that proposed to him.

The premises:

- Location
- Description – type of structure, age, general appearance and condition of repair and maintenance.
- Leased or owned: who are the landlords?
- Are they only occupied by the assured or are they shared or sublet?
- Occupancy – what are the normal working hours at the premises, during what times are they unattended?
- Key holders and opening-up / closing-down procedures.
- Adjacent risks – eg a neighbouring chemicals warehouse, flood risk – use the postcode-based flood map at http://www.gov.uk/check-flood-risk/
- Any on-site hazards or processes – hot-working machinery or fabrication, for example.

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Security:

- Perimeter fences and gates.
- Doors and windows.
- CCTV and intruder alarm systems – how is access to the control and recording equipment restricted, use of PIN codes, off-site (central station) monitoring and police response details (URN)
- Staff selection and monitoring – criminal records checks, random stop and search of people and vehicles.
- Standards for alarms:
- British Standard 4737/BS EN 50131 for wired alarms, BS EN 6799 for wireless alarms
- Must be installed and maintained by a certified business – see National Security Inspectorate (NSI) approved business https://www.nsi.org.uk/ or http://www.ssaib.org.uk.
- Manned guarding – by contractors approved by the SIA – https://www.services.sia.homeoffice.gov.uk/Pages/acs-roac.aspx

Fire risk (and mitigation)

- Is there any aspect of the premises construction, contents or use that represents an increased risk of fire?
- Management of waste and debris such as pallets, packaging, paper etc. Storage of combustible materials outside the premises should be at least 2m clear of the outer walls.
- General housekeeping
- Electrical safety testing and maintenance, eg. PAT testing.
- Fire-risk equipment and machinery – heating systems, forklift trucks and chargers, lights (need to be clear of warehouse racking and cargo) etc.
- Fire doors and fire fighting equipment – refer to BS5306 for fire fighting installations and portable equipment on premises
- Fire alarm system – refer to BS5839.
- Availability / proximity of fire hydrants or other water sources.
- Evidence of management control (prohibition) of cigarette smoking and designated smoking areas well away from the building.
- Sprinkler systems – obtain all certificates and test/maintenance records; highlight any concerns for investigation by an appropriate expert.

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Control of goods:

- Goods inwards and outwards control – documents, procedures, monitoring of collecting/delivering transport companies.
- Stock management systems.
- Physical audits.
- Proper control and identification of storage areas – how easily can the business locate and track its property.

Control of contractors:

- Selection, management and audit of 3rd party warehouse keepers and transport or freight forwarding businesses.
- Contracts with service providers, enhanced or limited liabilities? Quality control and KPI's defined?
- Proper system of cargo documentation and reporting between the insured business and its contractors.

Loss history:

- What previous losses has the business experienced over the preceding 3-5 years?
- What lessons have been learned from any such incidents?

Insured values:

- Based on investigation and discussion, state the approximate max/min values at risk, and briefly discuss the factors that produce any variation in values (peak sales or production periods, for instance)
- Describe and value the estimated maximum loss – what is the largest loss that might occur at the premises in normal circumstances and if all protections work normally?
- Describe and value the MPL (maximum possible loss) what is the most expensive loss that might occur, if everything that could go wrong, did go wrong?

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Loss Investigations.

As well as claims for damage and deterioration, cargo surveyors are called upon to investigate and report on cases of theft, pilferage or partial loss of cargoes. To understand some of the basic issues surrounding these losses will be important.

- The vast majority of shipments in which we become involved are insured from door to door rather than just port to port.
- They may be shipped in sealed containers or road trailers
- The loss-discovery is commonly pushed back to the point of off-loading, usually remote from the port of entry and the cargo has, invariably, been exposed to movement by road and the additional theft risks arising therefrom.
- There are also some theft / crime risks that are peculiar to the transport industry.
- It is important that the cargo surveyor establish:
- The truth of any claim for theft or shortage and,
- To the best of his ability, the method of the theft and,
- In whose custody the cargo was at the time that the theft occurred.
- The contractual chain.

These details are critical in determining policy liability and in securing any recovery from the responsible parties; of which there may be several in the overall voyage.

Some thefts may appear to be obvious; for instance, the driver of the truck delivering the cargo may have been hijacked and may have a very clear story to tell about the circumstances. Alternatively, the trailer or container may show some obvious signs of forcible or violent entry to which the driver may or may not be able to add some narrative, depending on whether or not the alleged events happened while he was with the vehicle and depending on whether or not the driver was awake or asleep when the alleged incident occurred.

Other alleged thefts or pilferage can at first appear inexplicable, particularly if a container or vehicle should arrive with no obvious sign of forcible or violent entry. When these circumstances arise, the surveyor should take a good deal of time and trouble to consider how and when the loss might have occurred in order to assist in claim validation and to secure the clients best recovery prospects: the insurer will not be liable to pay if it is proven that the insured shipper simply failed to send the missing goods.

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However simple or complex the problem might seem, there will be an explanatory story: taking the time and adopting a logical thought process and putting a series of logical questions can establish the true facts.

What has been lost?

Hopefully the surveyor will have had the opportunity to attend the outturn of the conveyance and count the goods personally. In these cases, the surveyor, must ensure that the receiver clauses the delivery document, making a full and accurate statement on it, of what was received/lost.

If the surveyor was not present during outturn, the receiving warehouse would or should have made a full outturn tally of what was received and should have claused the delivery note. The surveyor should make some further effort to verify and substantiate the nature of the loss; perhaps record a brief statement from the warehouse personnel or review any available CCTV. Remember that CCTV recordings are usually overwritten after a fixed period (anything from 7 to 60 days). CCTV can often throw light on the discrepancy and help in resolving issues.

When/how was it lost?

This is not always a simple question and we can only give some general guidance in this document. In most cases the conveyance will have been sealed and secured in some way, either with a numbered security seal attached directly to a door locking mechanism or to the ends of a cord (the TIR cord) securing the curtains and doors on an European road trailer, or secured by a physical key operated lock on the doors.

The driver of the vehicle, or the shipper, should be able to explain how the conveyance was secured. The driver and the shipper, between them, should be able to give an account of how any Security Devices were overcome and, unless the alleged thieves removed the devices, there should be some physical evidence such as a cut or forced lock or padlock or some physical evidence of how the conveyance was entered.

If there is no sign of forcible entry and if the driver knows of no circumstances during the journey which would explain the loss, then remember that criminals may have gone to some lengths to hide their crime. For instance locking bars, handles and seal carriers on the containers and trailers can be partly or wholly dismantled so that the doors can be opened without disturbing the seal, before reattaching the fixtures and fittings. Seals can be tampered with and reassembled so that they appear to be intact: they must be carefully inspected for any evidence of this. Check all of the lock related handles,

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fixtures and fittings for any sign of recent unbolting, cutting or replacement of the standard bolts and rivets. In particular, check very closely the rivet which attaches the locking door handle to its locking bar as this is a favourite point at which the sealed handle can be disconnected allowing the door to be freely opened. This connecting rivet is sometimes drilled out and replaced with a fresh one or it is replaced with a nut and bolt, sometimes a false rivet – internally threaded so that the head unscrews!

Regardless of how little or how much information the driver is able to tell you, do not be afraid to ask the driver or the transport company to provide you a copy of the tachograph disk or download, because this will confirm, for all interested parties, whether or not the movement of the vehicle was normal for the journey and whether or not the driver's story is correct or accurate. It is sometimes too easy to suspect the involvement of the driver and, as a general rule, if you suspect something or somebody, test the evidence; can you explain away / disprove your suspicions?

If the losses occurred because of a reported incident such as forcible entry during overnight parking, the theft of a complete vehicle and load, intercepting the driver and diverting him to offload at a place other than the delivery address and so on, then the police should already be involved. If they are not then the surveyor should direct the parties involved to immediately make a complaint to the police.

The surveyor should ascertain the details of the alleged incident and then take some basic steps to corroborate what is being said. For instance, the surveyor should visit the place where the crime is alleged to have happened and make efforts to check whether the allegations are, or could be, correct. Are there houses or businesses in which people may have witnessed the events alleged to have taken place? Are there any private or municipal CCTV systems that may have captured the events? Visit the CCTV operator in person and ask whether or not any of their cameras are directed at the location in which you are interested and whether the operators will review their tapes with you. If they will not review the tapes with you, ask them if they would kindly archive the footage from the relevant camera and time frame in order that the police may take a copy if necessary. Then you should check that the police are aware of the possible source of evidence and let them know who to contact in order to get it.

If the alleged incident involved some forcible entry then examine the location for any debris such as cut metal, discarded seals, locks or broken glass. This all helps to support or refute the story you have and thus avoids unnecessary doubt or suspicion.

Check all paperwork – packing lists, despatch notes, bills of lading, gate-passes, delivery/collection notes etc for earlier evidence of the seals or other security devices.

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There can sometimes be doubt about where or when a seal may have “disappeared”. Contact the ocean carrier for their records. They will normally oblige if the records do not implicate their legal liability and in the contemporary framework of ship, port and cargo security there is often a more comprehensive record of things like seal-integrity than there was in the past.

If the vehicle has arrived with seal intact, check the records; has the seal number changed en route?

As a general rule, don’t accept “a story” as a “fact”. There are always ways to corroborate much of the information that people will give you and people understand and expect a level of investigation and proving of circumstances, more than just “He said....” or “I was told...”

Do not rely on the manager telling you what his staff have told him: he may simply misquote the facts or worse, add a slant to satisfy insurers! Always try and reach the ‘original source’ who can give you reliable evidence.

Vehicles are increasingly likely to be subject to satellite tracking – either for security or to assist the operators in traffic-planning. The records produced by these systems can be invaluable. Remember that even if the operator of the vehicle has allowed his GPS Service to lapse, the GPS company will likely still hold data for the vehicle. Also, even though the vehicle operator might have purchased a GPS plan that gave him limited detail, the GPS provider might hold very much more information in their systems. As a general rule, GPS systems provide the maximum possible data by default, what gets reported to the customer depends on what they choose to pay for. Always contact the GPS provider directly to confirm this.

To corroborate a story is not to call anyone a liar and the surveyor must ensure that no mixed signals are given out that might lead anyone to feel “accused” or “doubted”, unless there are very good reasons for any such doubt

Witness Statements

These are easy to take with suitable training and experience and can be extremely valuable for recovery and claim validation purposes.

If in doubt, take a written statement. If someone is likely to give some critical information that could decide whether a claim is payable or whether a recovery will succeed in full or in part then, by default, get it in writing.

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A witness may tell you in clear and unambiguous detail that they left the engine of their truck running while they went into a shop for cigarettes.

When that comes back to them 6 months later as grounds for a full recovery or for a repudiation, they will try hard to deny that, to say that they did not admit it, that there was some misunderstanding, that the surveyor was wrong etc.

A witness statement is an immediate, hand-written record of the conversation. It proves the witness said the things, it proves they read the statement, it proves they signed and accepted the statement as a true record.

Write neatly. Write numbered paragraphs – each one a concise single statement of a particular fact. Get the witness to initial the end of each numbered paragraph and the bottom of each page as well as the caution/statement of truth on the first page.

Ensure that the witness can read English (there are still some illiterate English nationals and of course we will also meet people for whom English is not their first language). If you find yourself in the position that you want to take a statement but the witness cannot read English, try and get somebody else to read it to them (preferably someone sharing the mother tongue of the witness) and get that person to also witness it and state on it that they have read it and are satisfied that the witness understood them.

Validation / Fraud Screening

Other titles for this might be “Did it ever exist...” or “Why was it being shipped...” or “Was it the thing it was alleged to be...”

Fraud screening and detection relies 90% on experience, 10% on instincts. Not the other way around. For the purposes of this paper, only a general overview can be discussed.

“Did it ever exist...” this is one of the most common frauds and one of the hardest to detect and prove, except after being detected as a pattern of losses and the subject of a concerted investigation. This concern does not apply so readily to dealings with big business, multinational shippers and receivers – if LG Electronics says that container ABCD123456-7 contained 200 refrigerators, you can generally be fairly sure that it did.

A common fraud involves deliberate short-shipment of goods for the purposes of creating an insurance claim, or for defrauding an innocent buyer. An example would include containers of breeze blocks equal to the weight of the goods supposed to be there – or containers with mostly breeze blocks and a few rows of real goods to the doors, to survive cursory inspections.

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These fraudulent containers can arrive with or without some convenient grounds for a claim – tampered doors, no seal or other indications of possible opening during the voyage.

In such circumstances and in any event of a claim for the total loss of any container or cargo by loss, mis-delivery or theft, take reasonable steps to verify the bona fides of the receiver and of the shipper, to make sure that these parties are real and involved credibly in the trading of the claimed cargo. It has been known for a conspiracy of shipper, receiver and haulage company to stage the "loss" of goods which never existed.

Sometimes "phantom" cargoes are discovered in an unrelated incident – damage to containers on a ship, an accident at the port or on the roads, a customs examination. Such instances may expose a short-shipment fraud against the buyer or the insurer.

"Why was it being shipped..." Transported goods can be the object of a money laundering operation – something to which the shipping industry is particularly prone. By this we mean that one way of moving illegal money from one place to another is by shipping air. I have a million dollars in Curacao that I want to have in London. I can't transfer it because I earned it from drug dealing. So I ship containers of breeze blocks from my front-company, Smith Enterprises Ltd – appearing to be an electronics trader in Ealing. Each container is fraudulently and comprehensively documented as iPods and Play Stations. The receiver (me trading as Jones Imports of Curacao) settles the Smith invoices for 10 such containers a month and, hey presto (give or take a bit) all that drug money has now been "earned legally" in Ealing.

Be aware, also, that there are other forms of crime and fraud which affect the shipping industry and marine insurers. Money laundering is the principal one. Tax, Tariff and Quota frauds are another. In Europe, the VAT carousel fraud is still prevalent – the tax theft currently happens mostly in Germany, but affecting all member states, because the fraud relies on goods (mobile phones, CPU's etc) physically moving through at least two member states. The tax theft happens on the import/export completion of one of the states involved in a circular trade of the same goods. We recommend further reading on the subjects "Carousel Fraud" and "MTIC" – Missing Trader Intra-Community Fraud.

Manufacturers and governments place regional tariffs and quotas on many commodities from consumer electronics to food and drinks. "Grey Market" or "Parallel Market" trading or busting quotas and tariffs can be illegal.

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If goods are shipped for an illegal purpose, then insurers may not be liable to pay even if the loss was genuine. The issues that arise are moral hazard, public interest, non-disclosure.

"Was it the thing it is alleged to be..." Criminals using goods to commit a fraud, are not interested whether the goods are real or not. They would prefer not to have to ship real iPods – expensive to buy – if there are fakes available. Fraudsters staging an insurance claim will do likewise. Our profession has seen fake everything –from dummy mobile phones to fake perfumes, to computer software that was blank disks or open-source programs, to dummy computer processors. These frauds often come to light after a botched theft and/or a partial recovery. If there are other grounds for suspicion, then the surveyor should inspect the not-stolen or recovered part of any shipment. Open the boxes, remove the packaging, ask to see the products functioning.

Another aspect of trade fraud, insurance fraud or money laundering is ***inflated value***.

Using breeze blocks, dummy iPods or phones can be risky – there is the risk of discovery. Better to use something that is what it appears to be. Examples include dirt-cheap moisturising creams purchased by the ISO Tank-load and decanted into 10ml containers sold as the latest, greatest wrinkle defeating miracle-cream for USD500 an ounce. London tap water bottled, labelled with brands and trademarks registered by the criminal gangs and then sold as some rare mountain-spring issuance for GBP20/ltr. There is also a thriving fraud in rare metals and non-hazardous medical isotopes which are in fact very common, relatively cheap – as opposed to the inflated values of up to EUR50,000/gram quoted by the fraudsters.

Spotting this type of fraud can be more instinct than experience – if in any doubt, ask questions, ask colleagues and peers, ask police and/or known reputable businesses in the same trade for a reality-check.

Whatever your suspicions, if you think a crime, or a conspiracy, or a lie is being committed, try to clarify and disprove your concerns. If the concerns remain valid, and police are already investigating the incident, then share your concerns with the police. If the police are not already involved and there is no urgency for intervention and no public safety issues, then discuss your concerns with your client before writing a report and agree with them a way forward.

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2.3 - SILVER NITRATE TESTS.

In the event of water damage, the surveyor can carry out a simple silver nitrate test (AgNO3) to determine the presence of chlorides and therefore the possibility that the damage might be the result of contact with seawater. Surveyors should remember that the silver nitrate test is an ***indication only*** of the presence of chlorides: further investigation by laboratory analysis might be needed to ***prove*** the presence of seawater.

The silver-nitrate test solution comprises:

- 2 parts silver nitrate
- 2 parts nitric acid (chlorine free)
- 96 parts distilled water

A very basic chloride-test involves dropping some silver nitrate solution onto a wetted piece of the cargo or its packaging and – as an essential control – dropping some onto a dry piece of cargo or packaging. A positive result (the silver-nitrate solution turning white) on the wet cargo, suggests salt-water wetting. A positive result on the dry cargo means that the cargo or packaging contained or carried chlorides anyway, and nothing can be concluded about the origin of the wetting.

A better method of testing would be to rinse the wet – and the control – samples with distilled water and to collect the run-off in clean containers then to add the test solution to the run-off samples.

Samples can also be collected and sent to laboratories where they can be analysed for other chemical markers of seawater, which might constitute actual proof of sea-water wetting.

It should be noted that some packaging materials contain chlorides which may give a positive result, hence the potential need for further analysis.

2.4 - CONTRADICTORY SURVEYS

This refers to surveys of damage – or investigations of other losses – where the survey or investigation is performed jointly by representatives of different parties.

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For instance, the different parties in any incident could be:

- The cargo owner
- The cargo insurer
- One or more carriers involved in the transport of the cargo
- A shipper or receiver, not the cargo owner

All of these parties might wish to have their own impartial surveyor present to ensure that their interests are properly protected and that the entire process is fair and reasonable.

When these contradictory (or "joint") surveys take place, it is not the intention that each surveyor or expert should try to "get one over" on the others. Nor is it the role of each surveyor to dispute everything unfavourable to their client.

These parties, who might later be in dispute, are instructing a representative to ensure that all the facts are properly and fairly established and communicated.

It is the role of the surveyors or experts to discover the facts and to agree amongst themselves what the truth of the situation is. Every fact established and agreed upon by the surveyors is one fewer costly argument, at a later date.

At the end of the survey, the representatives should hold a discussion and agree all the points that can be agreed upon and then each surveyor must report those agreements to their respective clients.

If any surveyor disagrees with the majority, they must state their disagreement at the time, or as soon as the disagreement arises, if after the survey and meeting. All dissenting opinions must be reported by all the surveyors, to their respective clients.

2.5 - LETTER OF INDEMNITY

When original documentation is unavailable, misplaced or possibly even lost a "Letter of Indemnity" (LOI) signed by the consignee can, in certain circumstances, be accepted by insurers in lieu of the correct documentation. Other examples of letters of indemnity are where an insurer is asked to settle a claim or return premium without production of the original certificate of insurance or where an original bill of lading has been lost and the consignee wants the carrier to release the cargo.

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The intention of a Letter of Indemnity is that the person issuing it is agreeing to hold harmless or to indemnify someone else for any consequences upon that someone, which might arise from them doing something in the absence of the correct documents.

A surveyor should also be aware that a shipper of goods, which are damaged or deficient, might attempt to persuade the carrier to issue a clean bill of lading in return for a letter of indemnity holding the carrier harmless. This type of letter often has a fraudulent intent and would be completely unenforceable at a later date: the carrier would be liable to the receiver for the fraudulent issue of a clean bill of lading.

The issuance of any LOI should be treated with caution as in some circumstances it may be construed as tantamount to fraud i.e. where a shipper asks a vessel not to clause Bills of Lading detailing the loaded condition of goods against an LOI.

2.6 - CONTAINERS

Marine Containers

Surveyors should familiarise themselves with the various types and sizes of containers. In this regard there is much information available in publications and on the internet.

The concept of containerisation is that a manufacturer receives a suitable container into which the product is loaded by his staff. The container is then closed, sealed and taken by road/rail to the port where it is loaded to a container vessel, shipped to destination, discharged, transferred by road/rail to receivers and unloaded with the cargo only be handled on two occasions and protected during transit inside a metal box. Experience has shown, however, that improper stowage/securing, water ingress and physical damage to the container can cause damage to the cargo.

With the shipment of different types of goods, the container has evolved into a multi-faceted transport system. You now have 20ft, 40ft or 45ft general purpose (GP) containers; refrigerated containers and flat racks, etc.

These containers are now generally loaded to purpose built fully cellular container ships although there are instances when they are carried as cargo on more conventional vessels. The containers are built with their own securing equipment – twist lock recesses at the top and bottom of each corner. By the use of twist locks, the containers

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are easily secured at the bottom to the deck and to another on top. On container ships they are also lashed into position with container lashing bars tightened with turn buckles.

You should be aware that today, with most shipboard operations, the ships' company are unaware of what is inside the container and certainly have no say in how it is secured internally. Generally, the stowage location on the vessel is not determined by the ship but has been calculated by a 'ship planner' who is based ashore, who takes into account the vessel's stability, bending moments and shear stresses, the cargo, its weight and its final destination.
When a container ship calls at the port the master is given a stowage plan accordingly which he should check with the ship's loading computer and this is generally adhered to.

In today's age, the container ship berths and the container operators load the ship and, when completed and secured, she sails to the next destination.

It should be noted that container vessels have on board a lashing plan approved by a Classification Society and this should be adhered to. If containers are loaded onto a conventional vessel, they should be secured in line with the guidance contained within the CSS code.

However, there have been numerous instances on vessels of collapsed stows/shifting of cargo, etc, all of which have to be investigated thoroughly. The collapsed stow may be as a result of poor securing or it could be as a result of one container being overloaded having excess weight which has led to the securing failing. When investigating a collapse, the loading plan should be obtained to determine the weights of all containers in the stack. The securings (i.e twistlocks/lashing bars) should also be inspected and possibly retained pending analysis.

As detailed above with the ongoing developments of containerisation the use and operation thereof has become more sophisticated but not necessarily better.

Containers are ideal for full loads but what happens if you have only a few pallets to ship. Welcome to the groupage system and a host of new problems! In these cases, the shipper transports his pallets to a 'container consolidator' who collects cargo from many shippers. The consolidator then puts (stuffs) it all into one container for shipment to the common country of destination i.e. a groupage container. At the country of destination, the container is collected at the port and taken to the local consolidator where it is unloaded (unstuffed). The pallets are then delivered by road to the final customer. This

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leads to more handlings and therefore potential for damage and the shipper has no control on how the cargo is placed in the container.

Despite containerisation, all cargoes should be adequately protected for the rigours of transit including suitable water barrier packaging.

It should be noted that whilst container doors have seals on them to prevent water ingress there have been many cases where containers have sat in water and the water has come up via the floor.

Besides the GP (General Purpose) containers there are also refrigerated containers for the carriage of fruit, vegetables, pharmaceuticals and the like. These now have integral refrigeration units which operate off the vessels power system. The surveyor should be familiar with these, and also the temperature recording devices fitted.

Once off the vessel the containers are usually transported to destination by lorry without benefit of refrigeration but, if necessary, it is possible to fit a genset to the unit to maintain power, or specialist trailers with an under-slung diesel generator are available – albeit rare.

Road/Rail Freight Containers/Trailers.

With the development of the European Union, better modes of transport and the constant need of consumers for new products and fresh produce, more and more shipments are arriving in the United Kingdom by road and rail.

Rail freight usually comprises of marine type containers being placed onto special rail wagons at an inland rail freight terminal and then being transported to a destination freight terminal where the containers are placed onto lorries for final delivery to destination. On occasions some shunting damage occurs.

Trailers being transported throughout Europe comprise, in general, what are termed as tilts, taut liners, curtain siders and refrigerated trailers. There are also specially designed trailers i.e. glass carriers.

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Airfreight Containers

A substantial amount of cargo is now shipped around the world by air.

Exporters deliver the cargo to the ground handlers where it is loaded onto air pallets of size 3.0 m x 3.0 m. Once stowed the cargo is usually covered with plastic sheeting and the whole is held in place by a cargo net. The ground handlers build the pallet up to fit the interior shape of the aircraft.

Refrigerated cargo is also shipped by air and these can be placed in variations of the airline ULD (unit-load-device) that provide temperature control. Most of these units rely on blocks of dry-ice, that gradually evaporate during the voyage. Shippers / Carriers must calculate the journey time and provide enough dry ice for the whole trip – or arrange for replenishments to be provided at trans-shipment points.

There are now versions of the ULD with electrically driven refrigeration equipment.

There are numerous changes of control for air cargo i.e. the shipper has to deliver to the ground handler, who then places it onto an air pallet, which is then handed over to the airline to place into the aircraft. The reverse operation occurs at the point of destination.

2.7 - HATCHES

During the course of your career, you will attend on board many vessels discharging or loading various cargoes. In some instances, this will involve alleged water ingress to the cargo. As such, inspection of the hatch covers will assist in determining the cause of the wetting.

When attending on board it is important to identify the type of hatch and its closing mechanisms.

These can sometimes comprise of pontoons, hydraulically controlled folding hatch lids or variations of the above.

Irrespective of the type, when inspecting hatch covers, you should be looking for their weather tight integrity.

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All hatch covers will have quick acting cleats at the side and ends and securing dogs at the top. The quick acting cleats serve to pull the hatch down onto the sealing rubbers/compression bars to attain weather tightness. These cleats, when secured, should be very tight. Any slack/looseness in the cleats will prevent the sealing of rubbers.

The top dogs should be hard home and ride over the adjacent hatch lids. These dogs serve to hold the hatch lids together and compress the transverse rubber seals.

On most hatch coamings there are drainage channels should water gain access to the sides of the hatch coaming. At each corner of the hatch lids there are drain holes and these should be checked to ensure that they are clear. These drain holes are usually fitted with float valves to ensure that water does not enter the hatch the other way i.e. from excess water on the deck during heavy seas.

Tests can be carried out to ensure the weather tight integrity of hatch covers. Two are a hose test and the ultrasonic test. Whilst both are reliable it should be noted that the tests are usually carried out when the hold is empty and in still harbour conditions. It should not be forgotten that, whilst at sea and in a loaded condition, the vessel is subject to a variety of forces which could lead to the vessel twisting/bending which could compromise the integrity of the hatch seals. Surveyors should make themselves familiar with both tests and the method by which they are to be carried out.

There are numerous publications concerning the construction and testing of hatches and hatch covers.

2.8 - ROUTING OF VESSELS

The routing may have a bearing on the arrived condition of cargo and the following factors should be taken into consideration:

- Time of transit – Any delay may lead to deterioration/heating of perishable goods.
- Transit route – Going from a hot to cold climate or vice versa may lead to condensation/cargo or ship sweat. The surveyor should be aware of the above phenomena and the need for appropriate ventilation.

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- Weather conditions – Vessels are able to obtain weather forecasts via systems such as Navtex or INMARSAT. On receipt of the forecasts, the Master should be able to determine the best route taking into account the current and forecasted weather conditions. In many instances, vessels are weather routed by the owners/charterers using commercial companies such as WNI (Weathernews Inc). These companies provide the Master with the forecasted weather and the best route to take to destination.

Wind speeds are measured from the Beaufort Scale and the surveyor should make himself aware of this scale and have an understanding of wave heights and speeds

2.9 - BEAUFORT SCALE.

In the 1800s there were no sophisticated instruments for measuring wind velocities and thus a form of measurement was devised which classified different wind-speeds based on observations of the effect of that wind. This is known as the Beaufort Scale.

Force	Description	Knots	mph	km/h	Wave Ht	Sea Description	On Land
0	Calm	< 1	< 1	< 1	-	Sea like a mirror	Smoke rises vertically
1	Very Light	1-3	1-3	1-5	0.1m	Ripples	Smoke drifts
2	Light breeze	4-6	4-7	6-11	0.2m	Small wavelets	Wind felt on face. Rustles leaves
3	Gentle breeze	7-10	8-12	12-19	0.6m	Wave crests begin to break	Leaves and flags move
4	Moderate breeze	11-16	13-18	20-29	1.0m	Small waves frequent white crests	Paper blown about. Small branches move
5	Fresh breeze	17-21	19-24	30-39	2.0m	Moderate waves. Many white crests	Large branches sway
6	Strong breeze	22-27	25-31	40-50	3.0m	Large waves. White foam crests	Small trees sway
7	Near gale	28-33	32-38	51-61	4.0m	Sea heaps up white foam in streaks	Large trees sway. Difficult to walk
8	Gale	32-40	39-46	62-74	5.5m	Moderate high waves breaking	Small trees blown down

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						crests foam streaks	
9	Strong gale	41-47	47-54	75-87	7.0m	High waves dense foam streaks	Structural damage. Chimney pots removed
10	Storm	48-55	55-63	88-101	9.0m	Very high waves. Sea surface appears white	Trees uprooted. Much structural damage
11	Violent storm	56-63	64-73	102-117	11.5m	Exceptional high waves sometimes concealing small ships	Widespread damage
12	Hurricane	> 64	>74	>119	14+m	Air filled with foam and spray. Sea white	Widespread damage

2.10 - SWEAT AND CONDENSATION

There are two forms of sweat, the first being cargo sweat and the second ship's sweat. Cargo sweat is the result of a cargo giving up its own inherent moisture content or part thereof. Ship's sweat, on the other hand, is the result of airborne moisture condensing on the ship's structure and dripping onto the cargo below.

It is important to understand how much moisture can be contained in air. The quantity of moisture in the air increases and decreases with temperature.

°C	50%	60%	70%	80%	90%	100%
-9						
-7	0.71	0.86	1.0	1.14	1.26	1.42
-4	1.79	2.14	2.5	2.57	3.21	3.57
-3.6	3.42	3.42	4.0	4.57	5.14	5.71
0	3.43	4.11	4.8	5.48	6.17	6.86
2	4.86	5.83	6.8	7.77	8.74	9.71
4	5.21	6.26	7.3	8.34	9.39	10.43
7	6.43	7.71	9.0	10.29	11.57	12.86
10	7.86	9.43	11.0	12.57	14.14	15.71
13	9.07	10.89	12.7	14.51	16.33	18.14
15.5	10.5	12.6	14.7	16.8	18.9	21.0

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18	11.78	14.14	16.5	18.86	21.21	23.57
21	13.14	15.77	18.4	21.03	23.66	26.28
24	15.71	18.66	22.0	25.14	28.29	31.43
27	18.57	22.28	26.0	29.71	33.43	37.14
29	21.43	25.71	30.0	34.28	38.57	42.85
32	24.29	29.14	34.0	38.86	43.71	48.57
35	27.86	33.43	32.0	44.57	50.14	55.71
38	32.14	38.57	45.0	51.43	57.86	65.28

In the context of the carriage of goods, the surveyor needs to understand that warm air can hold large amounts of water vapour. If that warm, moist air blows over a cold surface, the moisture will condense out of the air and onto that surface.

This could produce rusting, spotting and lifting of labels on canned goods, where the cans are cooler than the surrounding air. Water condensing on the ship's structure can drip onto cargo – ship's sweat.

Cargo sweat tends to manifest as the movement of moisture through a cargo (typically of bulk or bagged cargo) so that part of the cargo become damaged by the moisture. Ship's sweat manifests as pooling or running water damage and/or dripping from the ship's structure onto the exposed cargo-surfaces.

Sweat and condensation can be mitigated by ventilation, but this needs to be carefully controlled. If the vessel has travelled from a cold climate and is travelling through tropical climates, then ventilation should be stopped – as it would only serve to force warm, damp air over cold structures and cargo. When travelling from warm to cold climates, ventilation can be increased so that warm damp air is forced out of the cargo spaces before the reducing temperatures bring about condensation.

There are several publications on the cargo ventilation methods including "Cargo and Cargo Hold Ventilation" https://safety4sea.com/wp-content/uploads/2020/11/INTERCARGO-Cargo-Ventilation-Guide-2020_11.pdf

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2.11 - SALVAGE SALES

In order to best mitigate the loss for whom concerned, the surveyor may sometimes be involved in a salvage sale of the goods under claim.

Goods remain the property of the owners until such time as a claim might be paid and their title transferred to insurers (by the signing of a subrogation form)

Ideally, the surveyor should – with the agreement of insured and insurer – try to reach an agreed depreciation or allowance with the insured, whereby the insured keeps the salvage interest in return for a discount of the claim.

If a salvage sale is to be conducted, it must be with the written consent of the owner of the cargo and any commissions to be charged must be notified and agreed in advance.

The surveyor – and/or his firm – must be a neutral party and cannot bid for the cargo nor have any business connection to any of the bidding parties.

In selecting and inviting potential buyers, the surveyor must use best judgement in selecting reputable buyers, who have the ability to properly handle and take the cargo if they win the bidding process.

Each bidder must receive exactly the same information about the cargo – description, quantity, detail of the damage or incident and opportunity to inspect it. Any questions received and answers given, should be advised to all the potential bidders.

The sale should normally be on terms “As and where lying with all faults, whether known and visible or not, EX WORKS” or similar – reducing risk to the surveyor, insurer and insured.

The tender-period should be clearly defined and bid-submission to be at a fixed time and place (or in the modern climate a fixed method such as by email or by fax to a specified number)

The surveyor must not communicate any prices to any of the bidders and the sale must be awarded to the highest bidder.

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2.12 - RECOVERIES

The insurer that pays out for cargo loss or damage or for their assured's liability, will wish to seek any recovery that could be due from a responsible carrier or third-party. The surveyor must have these potential recovery-rights at the forefront from the moment of their instruction.

The most important issue is to protect those rights, because laws and commercial contracts governing the carriage of goods typically have time limits within which complaints need to be lodged to the carrier and then within which a claim must be presented and settled.

The simplest way to protect rights is to write to the carrier(s) or third party(ies) in simple terms:

Dear Carrier:

Re: Our principals' insured: Smith Industries
Wet Damage to 10 cases of stuff
A to B bill of lading 123/4 dated 10 October 2099
Delivered somewhere, 15 October 2099

We bring to your attention the fact that this cargo suffered damage noted on arrival. As this damage occurred in transit, we hold you responsible for all costs and consequences arising and confirm that a quantified claim will follow either from Smith Industries or its insurers.

Please confirm whether you or your insurers wish to attend joint survey of the goods at [PLACE/TIME]

But be aware that, strictly speaking, such notices must be issued by the legal owner of the goods, so it is better to direct the receiver to issue an appropriately worded notice in their own right and in addition to any other survey-related correspondence.

The carriers and other potentially responsible person must be permitted access to survey the goods and preferably by attending a contradictory or joint survey.

When surveying the cargo, take care to consider the cause of the loss or damage and who, if anyone, might be to blame. When reporting, be sure that recovery prospects are

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discussed in a separate paragraph that ties together the findings about cause with the journey history so that a narrative emerges that explains when/where damage occurred and why it might be the result of someone's negligence or other responsibility.

It is essential to report as quickly as possible to the client, so that they can instruct recovery agents to start working on the recovery and protecting time at the earliest possible opportunity.

If a surveyor has a file that is approaching 6 months from the date of the incident, refer to the client for explicit instructions about the recovery action: because at 9 months from the incident date, statutory or contractual time limits might be applicable.

PART 3: TEMPERATURE CONTROLLED CARGOES.

3.1 - INTRODUCTION

Temperature controlled cargoes are invariably perishable to a greater or lesser degree, and their safe carriage depends on maintaining suitable storage conditions during transportation. This is true for all modes of transport and all cargoes, though conditions are more critical for longer journey times and for more perishable commodities.

Temperature controlled cargoes include both frozen and chilled goods, the latter including fresh fruits and vegetables. Generally, frozen goods do not suffer if over-cooled, whereas chilled goods can be damaged by low temperatures, either by freezing or by chilling injury to fresh produce.

Successful transportation is dependent on the carriage instructions, which define the conditions in which the goods are to be carried. If these instructions are incomplete, inadequate, contradictory, or wrong, then problems can be expected. For the shipper, there is the risk of loss of cargo. For the carrier, there is the risk of a claim even if the goods are undamaged. Many shippers and carriers are prepared to accept inadequate instructions either through ignorance or through unquestioning acceptance of what has been accepted previously by themselves or others. Instructions may be based on goods of different origin, which may have different requirements.

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The way in which cargo is stowed into holds or stuffed into containers is important for successful carriage and requires considerable care. The brief rule of thumb is that deep-frozen cargo is best stowed in blocks to allow the circulating air to insulate the outside of the stow but with chilled cargo it is important that adequate ventilation is provided throughout the stow. It is recommended that care is taken to ensure that the most suitable ventilation and stowage arrangements are provided to the particular cargo carried as individual requirements vary considerably.

These recommendations regarding carriage instructions have been drawn up by International Cold Chain Technology ("ICCT") to assist both shippers and carriers to re-assess their carriage instructions in order to improve the operation of refrigerated transport chains. Any suggestions for improving these recommendations would be welcome. We are indebted to ICCT for permission to reproduce their recommendations and ICCT contact details are contained at the end of this section should any student wish to develop any of the points made.

First, general requirements are considered. Thereafter, separate sections relate to containerised cargoes and to shipments in reefer vessels. For ease of reference, points that are the same for both types of transport are repeated in the appropriate sections.

3.2 - GENERAL REQUIREMENTS

The responsibility for specifying carriage instructions is that of the shipper, the owner of the goods. Only the shipper knows the full nature of the goods and their requirements. Frequently this responsibility is passed to the carrier, but in this case the shipper prior to shipment should agree the acceptability of the specified conditions.

In either case, the exact nature of the cargo needs to be known - in the case of fruit, for example, carriage requirements may vary dependent on type, variety, maturity, origin and growing season conditions.

If mixed loads of differing commodities are to be carried in a single cargo space, it is necessary to consider compatibility of temperature, atmosphere (especially ethylene levels) and liability to taint. This will usually require specialist cargo care advice. It may be necessary to ensure that carriage conditions are specified to all carriers in the transport chain, as frequently an international journey may use different carriers at the start and end of the journey.

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Items such as relative humidity and maximum time without refrigeration should not be over-specified but should meet the necessary requirements of the goods. Over-specification of requirements is to be avoided as it tends to lead to more, and sometimes spurious, claims regarding technicalities which have not actually affected cargo quality.

Many of the specific items listed below may be taken for granted with regular shipment but may need to be specified if a new carrier is used.

3.3 - SPECIFIC REQUIREMENTS FOR CONTAINERISED CARGOES.

The parameters that may be included in carriage instructions for containerised refrigerated cargo include the following.

- Pre-stuffing sanitation
- Pre-cooling of containers
- Cooling during part loaded conditions
- Prohibition of stuffing cargo at mixed temperatures
- Stowage requirements
- Ventilation
- Carriage temperature
- Maximum time without refrigeration
- Air circulation rate
- Relative humidity
- Measurement and reporting requirements
- Special conditions for cold weather
- Need to pass instructions to subsequent carrier
- Need to notify if limits exceeded

For Controlled Atmosphere shipments, additionally:

- Levels (ranges) for O2, CO2, humidity, ethylene
- Permitted time to reach specified levels
- Procedure in event of CA system failure
- Safety requirements
- Discharge atmosphere requirements

Each of these will be considered below.

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Pre-stuffing sanitation - The proper cleanliness and lack of odour in containers to be used for refrigerated goods should be a matter of normal good practice, but any special or particular needs should be identified

Pre-cooling of containers - Pre-cooling is only useful when loading from temperature-controlled loading bays; in other conditions, it can result in excessive moisture ingress from the atmosphere and is not recommended.

Cooling during part loaded conditions - Part loaded containers should be closed and temperature maintained if there is a delay before completing loading.

Prohibition of stuffing cargo at mixed temperatures - Properly pre-cooled cargo and substantially warmer cargo should not be mixed

Stowage requirements - Any special stowage requirements, such as a protected or underdeck stow, should be stated.

Ventilation - The rate of fresh air ventilation for fresh produce should be specified. This should be as an absolute figure in cubic metres per hour. The specification of a percentage rate of ventilation only has meaning if related to a specific container size and a specific model of refrigeration unit.

Carriage temperature - It is not physically possible to provide refrigeration in the absence of temperature differences, both between air and goods and within the bulk of the goods. The only temperature which can be controlled is the set point, which corresponds to air delivery temperature for chilled goods and to air return temperature for frozen goods. The term “carriage temperature” therefore has little meaning, and “set point temperature” should be specified. If appropriate, this may be augmented by a maximum allowable temperature during periods without refrigeration.

Although degrees Celsius are the international standard, in the USA degrees Fahrenheit are still commonly used. As zero C is a common chilled goods temperature and zero F is a common frozen goods temperature, great care is needed to avoid possible confusion of units.

For USDA and other cold treatment quarantine requirements, maximum pulp temperature may have to be maintained below a specified temperature throughout a continuous period of days or weeks, and only approved equipment may be used.

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Maximum time without refrigeration - Sometimes it may be necessary for statutory or other reasons to specify a maximum duration of time without refrigeration, either per event or in total for the journey. This should not be necessary if temperature limits are well defined.

Air circulation - Many containers have a high air circulation rate for chilled goods and a lower rate for frozen goods. If a speed change switch is fitted, low speed operation for chilled goods may be possible, but as this inevitably results in a wider range of cargo temperature, it is not recommended.

Relative humidity - When special equipment with humidity control is used, a range must be specified. It is difficult to measure humidity regularly to better than the nearest 2 to 3%, so an acceptable range of at least plus or minus 5% should be specified, albeit with a tighter target. Special equipment is available to maintain either high (e.g. 90%) or low (e.g.50%) humidity. Without such equipment, relative humidity is not controllable and should not be specified.

Measurement and reporting requirements - It is normal to record return air temperature in refrigerated containers, and some equipment also records delivery air temperatures. Any specific shipper requirement for reporting temperatures should be stated. When the refrigeration unit is not running, the recorded temperatures do not reflect cargo temperatures. Shippers may choose to put their own recording equipment within cargo, in which case they should inform both carriers and receivers.

Special conditions for cold weather - Sometimes special requirements exist for exceptionally cold conditions.

However, it should be noted that most transport refrigeration equipment will control temperature using either cooling or heating as necessary to maintain specified conditions.

Need to pass instructions to subsequent carrier - If there is uncertainty at the start of a voyage as to who will be the final carrier, it may be necessary to request the initial carrier to pass on carriage instructions.

Need to notify if limits exceeded - Procedures for notification of out of specification conditions should be established prior to acceptance of cargo for shipment. This could apply to warm loading, or to equipment failures, for example. Standard procedures and safe limits should be available.

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3.4 - ADDITIONAL REQUIREMENTS FOR CONTROLLED ATMOSPHERE SHIPMENTS

Controlled Atmosphere (CA) systems are designed to maintain an atmosphere different from normal, usually with low oxygen and increased carbon dioxide. They enhance the storage life of some produce when used in conjunction with refrigeration. There are additional requirements for such shipments, as follows:

Levels (ranges) for O2, CO2, humidity, ethylene - For each of the atmospheric gases to be controlled, upper and lower concentration limits should be specified.

Permitted time to reach specified levels - The maximum time allowed to reach the specified levels may be laid down.

Procedure in event of CA system failure - The failure of a CA system will not necessarily have a drastic effect on the produce if the refrigeration continues to run. In these circumstances it will be necessary to introduce fresh air ventilation to fruit and vegetable cargoes. This should be specified.

Safety requirements - CA produces an atmosphere which is deadly to humans - breathing an oxygen-depleted atmosphere produces immediate unconsciousness and fairly rapid death. Adequate safety systems must be in place, and these may need to allow for the possibility of stowaways in the cargo.

Discharge atmosphere requirements - The safety requirements extend to those unloading cargoes. Proper ventilation prior to entering containers and training of workers are both necessary.

3.5 - CONTAINERISED TRANSPORT OF PERISHABLES WITHOUT REFRIGERATION

Some perishable commodities are carried without temperature control, possibly for short-duration journeys, or in ventilated equipment. In these cases, it is wise to consider which of the above requirements may still apply.

Products with limited temperature sensitivity may be carried under temperature control for certain journeys only. The following guidelines suggest when this may be appropriate.

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- For any goods requiring close temperature control, refrigeration is essential. If temperatures need to be maintained within a band of 2 degrees C or less, refrigeration should be virtually continuous.
- At the other extreme, for less sensitive goods with a maximum temperature tolerance of 30 degrees C or above, refrigeration is only necessary for storage on land at high ambient temperatures. For containerised shipments at sea, a protected stow may be requested.
- If the maximum permitted temperature is 25 degrees C or lower, refrigeration should be used for any journeys through the tropics and for any journeys anywhere in summer.
- If cargo requirements are marginal, either in terms of temperature tolerance or in terms of possible delays at high ambient temperatures, then the only safe option is to use refrigeration. Frozen foods may sometimes be carried without refrigeration for short journeys as long as the cargo does not rise above the specified maximum temperature. This should only be done with the consent of the owner of the goods.

3.6 - SPECIFIC REQUIREMENTS FOR REFRIGERATED (REEFER) VESSELS.

The parameters that may be included in carriage instructions for refrigerated cargo include the following:

- Pre-loading sanitation
- Pre-cooling of cargo space
- Cooling during part loaded conditions
- Prohibition of loading cargo at mixed temperatures
- Stowage requirements
- Ventilation (or lack of) during cooling
- Ventilation thereafter
- Carriage temperature
- Air circulation rate
- Relative humidity limits or target
- Carbon dioxide limits or target
- Ethylene limits
- Measurement and reporting requirements
- Special conditions for cold weather
- Need to pass instructions to subsequent carrier
- Need to notify if limits exceeded

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For Controlled Atmosphere shipments, additionally:

- Levels (ranges) for O2, CO2, humidity, ethylene
- Permitted time to reach specified levels
- Procedure in event of CA system failure
- Safety requirements
- Discharge atmosphere requirements

Each of these will be considered below.

Pre-loading sanitation - The proper cleanliness and lack of odour in compartments to be used for refrigerated goods should be a matter of normal good practice, but any special or particular needs should be identified.

Pre-cooling of cargo space - The pre-cooling of cargo spaces removes heat from steelwork and provides a check on the operation of the refrigeration system. However, an excessive pre-cooling time only wastes energy and time. Duration of 24 hours after the required temperature has been reached is sufficient. The required pre-cooling temperature may be a few degrees lower than the required transport temperature.

Cooling during part loaded conditions - Part loaded spaces should be closed and temperature maintained if there is a delay before completing loading. Care should be taken to ensure that under these conditions the temperature is not held at a pre-cooling temperature below the required transport temperature for long enough to damage the cargo.

Prohibition of loading cargo at mixed temperatures - Properly pre-cooled cargo and substantially warmer cargo should not be mixed at loading.

Stowage requirements - Any special stowage requirements should be stated.

Ventilation (or lack of) during cooling - For most refrigerated cargoes, the cargo should be loaded at carriage temperature. For some cargoes, notably bananas and the less sensitive citrus varieties, cooling in transit is normal. In these cases, a period of 48 hours should be specified, during which fresh air ventilation is stopped to allow maximum refrigeration. Reference is sometimes made to the “reduction period” which is the time from hatch closure to the air return temperature reaching within 4 degrees Fahrenheit of the requested air delivery temperature. This is a parameter which may usefully be measured and reported but should not be specified.

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Ventilation thereafter - After cooling, or throughout in the absence of cooling, the rate of fresh air ventilation for fresh produce should be specified. This may be as an absolute figure in cubic metres per hour, or as a rate in air changes per hour of the empty volume of the cargo space. Alternatively, it may be linked to measured values of humidity, ethylene or carbon dioxide. Care is necessary to avoid requirements that conflict.

Carriage temperature - It is not physically possible to provide refrigeration in the absence of temperature differences, both between air and goods and within the bulk of the goods. Carriage temperature for chilled goods must therefore be specified as the air delivery temperature. Pulp temperatures may usefully be measured and reported. It may be required to specify a lower temperature for a limited period to ensure rapid cooling of warm cargo, known as “shock treatment”. Dual-temperature regimes, in which the delivery air temperature is changed after a specified period of days, may also be specified. For frozen cargo, it is usually sufficient to specify a maximum temperature that should not be exceeded. This may be subject to qualification for short periods. For example: Cargo temperature shall not exceed minus 18 degrees C, except for short periods during power disconnection or defrosting, when temperature shall not exceed minus 15 degrees C. A single specified “carriage temperature” is a meaningless specification that should never be accepted. Although degrees Celsius are the international standard, in the USA degrees Fahrenheit are still commonly used. As zero C is a common chilled goods temperature and zero F is a common frozen goods temperature, great care is needed to avoid possible confusion of units. For USDA and other cold treatment quarantine requirements, maximum pulp temperature may have to be maintained below a specified temperature throughout a continuous period of days or weeks, and only approved equipment may be used.

Air circulation rate - The rate of circulation of air around and through the cargo controls the range of temperature within the cargo, and also the rate of cargo cooling. Minimum rates may be specified, usually as multiples of the empty volume of the hold per hour. Often these multiples are misleadingly referred to as “air changes” per hour, or “ach”, a term best used for ventilation rather than circulation rates.

Relative humidity limits or target - Relative humidity is not specifically controllable in most shipments, and if there are critical requirements, either special equipment or special packaging or both may be required. A sensible specification is as follows. Relative humidity should be maintained at the maximum possible, after the delivery air temperature and fresh air ventilation requirements have been met. Over-specification of humidity requirements is likely to lead to conflicting instructions. When special equipment with humidity control is used, a range must be specified. It is difficult to

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measure humidity regularly to better than the nearest 2 to 3%, so an acceptable range of at least plus or minus 5% should be specified, albeit with a tighter target.

Carbon dioxide limits or target - For many fruits, a maximum level of CO2 may be specified, this to be the overriding parameter for ventilation rate control. Care is necessary to avoid conflicting ventilation requirements.

Ethylene limits - The measurement or specification of ethylene levels is rare, as accurate measurement at very low concentrations needs specialised equipment. If limits are to be specified, the measurement and control regime must also be specified.

Measuring and reporting requirements - It is normal for carriers to measure temperatures of the air in ships' holds. Any specific shipper requirement should be stated, especially if it involves cargo rather than air temperatures. Shippers may choose to put their own recording equipment within cargo, in which case they should inform both carriers and receivers.

Special conditions for cold weather - Sometimes special requirements exist for exceptionally cold conditions. However, it should be noted that most transport refrigeration equipment will control temperature using either cooling or heating as necessary to maintain specified conditions.

Need to pass instructions to subsequent carrier - If there is uncertainty at the start of a voyage as to who will be the final carrier, it may be necessary to request the initial carrier to pass on carriage instructions.

Need to notify if limits exceeded - Procedures for notification of out of specification conditions should be established prior to acceptance of cargo for shipment. This could apply to warm loading, or to equipment failures, for example. Standard procedures and safe limits should be available.

Additional requirements for Controlled Atmosphere shipments - Controlled Atmosphere (CA) systems are designed to maintain an atmosphere different from normal, usually with low oxygen and increased carbon dioxide. They enhance the storage life of some produce when used in conjunction with refrigeration. There are additional requirements for such shipments, as follows.

- ***Levels (ranges) for O2, CO2, humidity, ethylene*** - For each of the atmospheric gases to be controlled, upper and lower limits should be specified.
- ***Permitted time to reach specified levels*** - The maximum time allowed to reach

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the specified levels may be laid down.

- ***Procedure in event of CA system failure*** - The failure of a CA system will not necessarily have a drastic effect on the produce if the refrigeration continues to run. In these circumstances it will be necessary to introduce fresh air ventilation. This should be specified.
- ***Safety requirements*** - CA produces an atmosphere which is deadly to humans – Breathing an oxygen-depleted atmosphere produces immediate unconsciousness and fairly rapid death. Adequate safety systems must be in place, and these should allow for the possibility of stowaways in the cargo.
- ***Discharge atmosphere requirements*** - The safety requirements extend to those unloading cargoes. Proper ventilation prior to opening cargo spaces and training of workers are both necessary

BACS is indebted to Ian Lawton –Cambridge Refrigeration Technology for the compilation of the following guidelines.

3.7 - SURVEYING TEMPERATURE CONTROLLED CARGOES

Cambridge Refrigeration Technology ("CRT") , in conjunction with van Ameyde Marine, has produced these reporting format guidelines for surveyors in the hope that they will assist both surveyors of refrigerated cargoes and those appointing them. International Cold Chain Technology ("ICCT") is a discussion forum for cold chain.

ICCT members are aware that many surveys fail to note information which may be required in dealing with subsequent claims. These guidelines are designed to overcome this.

The guidelines take the form of two separate documents, the first for reefer ships and the second for containers and trailers. Each document comprises a check list of information which may be recorded, followed by narrative which provides explanation. It is appreciated that not all the information listed will be needed for every survey. Several issues (such as fresh air ventilation) do not arise for non-respiring cargoes. It is up to the surveyor to consider which items may legitimately be omitted on any particular occasion. Nevertheless it is recommended that all headings be considered every time.

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The electronic format of these documents allows entries to be made in tables, which will expand to accommodate that which is written. The documents may also be used to generate paper checklists.

They may be freely used without copyright restriction, but acknowledgement of ICCT is always welcomed. It is hoped that these guidelines will be widely used and recommended.

Whilst care has been taken in the preparation of these guidelines, neither ICCT nor any of its members can be responsible for the way in which they are used, which is beyond their control. ICCT will welcome information about any perceived errors or omissions.

These guidelines, guidelines on the definition of carriage conditions, and information on ICCT may be found at www.crtech.co.uk/icct.

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Refrigerated cargo ships

Instructing party	

Date and time of	
-instruction	
-survey	

Origin and nature of cargo	

Place of survey	

Reason for survey (alleged damage/condition)	

Name of ship	

Voyage number	

Name of	
-Master	
-Chief officer	
-Chief engineer	
-Reefer engineer	
-persons from whom information was obtained	

General particulars of ship	
-former names of ship	
-flag	
-port of registry	
-year of build	

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-official number	
-IMO number	
-class	
-gross tonnage	
-net tonnage	
-summer deadweight	
-length	
-beam	
-max summer draught	
-service speed	
-main engine type	
-generators type and capacity	
-number of generators	
-max capacity hfo/ifo	
-max capacity mdo/go	
-daily consumption of fuel oil (type)	
-daily consumption mdo/go	
-Owners	
-Operators	
-Managers	
-Voyage charterers	
-Time charterers	

Certificates	
-Certificate of registry	
-Class certificate	
-Class RMC	
-International tonnage certificate	
-Safety construction certificate	
-Safety equipment certificate	
-Cargo gear	

General arrangement of ship (see Appendix no.1)	
-number of holds	
-type of hatch covers	

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-hatch square minimum opening sizes	
-number of decks	
-capacity of each deck	
-deck area of each cargo compartment	
-deck heights	
-type of gratings	
-type of cargo gear	
-location of superstructure compared to hatchways	

Refrigeration arrangement	
-type of refrigeration machinery	
-type of air circulation in the compartments, and whether decks are paired or independent	
-capacity of air circulation	
-type of refrigerant, and whether direct or indirect system	
-location of air coolers and fans in the compartments (see Appendix no.2)	
-type of fresh air system	
-capacity of fresh air system	
-location of fresh air inlets	
-location of fresh air outlets	
-records about calibration of temperature-, humidity-, etc., sensors	

Controlled atmosphere arrangement	
-type of equipment (fixed or portable)	
-classification society (if portable)	
-type of machinery	
-type of control equipment	
-condition of equipment for injection	
-condition of equipment for monitoring of	

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atmospheres	
-arrangement of injection and control to decks	
-separation zones	
-arrangement of electrical supply	

History	
-previous loading/discharge port	
-previous cargo carried	
-hold cleaning method after discharge of previous cargo	

Cargo particulars	
-b/l number	
-b/l place and date of issue	
-type of b/l	
-description of commodity	
-marks and numbers	
-shippers	
-consignee	
-notify address	

Loading particulars	
-name of load port	
-date and time of arrival at load port	
-cargo hold inspection before loading	
-where was the cargo stored before loading	
-how was the cargo brought alongside	
-how was the cargo loaded on board	
-type of forklift trucks used in the cargo holds (electric/combustion)	
-delay, during removal of the cargo from cold store, truck, etc. and loading on board	

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-weather conditions during loading	
-stoppages during loading	
-times of loading of each individual deck	
-did cargo cover entire deck area	
-way of securing of cargo in the decks	
-who secured the cargo in the decks	
-was cargo properly stowed/secured	
-extent of free area for circulating air above the cargo	
-particular occurrences during the loading	
-remarks on the cargo documents	

Stowage plan (see Appendix no.1)	
-number of packages and weight in each deck	
-volume of cargo in each deck	
-extent of un-covered deck area	
-actual stowage factor of the cargo in each deck	

Voyage particulars	
-date and time of departure from load port	
-weather during the voyage to discharge port (wind force/direction and course of the ship)	
-particular occurrences during the voyage	
-inspection of cargo in compartments during the voyage	

Discharge particulars	
-name of discharge port	
-date and time of arrival at discharge port	
-inspection of cargo in compartments before the discharge	

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-how was cargo discharged (lifting, rolling, etc.)	
-cargo was discharged into (shed, truck, etc)	
-type of forklift trucks used in the cargo holds (electric/combustion)	
-weather conditions during discharge	
-stoppages during discharge	
-times of discharge of each individual compartment	

Temperatures	
-carriage instructions	
-pre-cooling of cargo compartments before loading	
-spike/pulp temperatures of the cargo during loading (individual readings; no averages)	
-outside air temperature during the loading	
-temperatures in compartments on commencement of the loading	
-temperatures and other parameters (delivery air, return air, space, RH, CO_2, O_2) in compartments after final closing (see Appendix no.3)	
-temperature and other parameters (delivery air, return air, space, RH, CO_2, O_2) during voyage	
-reduction period (see Appendix no. 4)	
-fresh air inlet regime during voyage	
-temperatures and other parameters (delivery air, return air, space, RH, CO_2, O_2) in compartments on opening for discharge of cargo (see Appendix no.5)	
-spike/pulp temperatures of the cargo before the discharge (individual readings; no averages)	
-spike/pulp temperatures of the cargo	

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during discharge(individual readings; no averages)	
-spike/pulp temperatures of the cargo during the survey (individual readings; no averages)	
-USDA sensors	
Condition of cargo	
-details of the commodity involved (variety, count, number per package)	
-description of package	
-marks and numbers of packages	
-picking and packing dates	
-name of grower/packing station	
-other codes on packaging	
-description of condition of the cargo	
-number of cartons on the pallet	
-construction of pallet load	
-difference in condition when considering grower, picking date, packing date, variety, count, location on pallet, location in cargo compartment or other compartment	
-location in cargo compartment of cargo claimed upon	
-history of commodity before loading	
-estimated sound market value of the cargo (c.i.f./ f.o.b.)	
-estimated depreciated value of the cargo	
-estimated total extent of the claim	

Further particulars	
-condition and cleanliness of cargo holds and air ventilation/circulating ducts	
-presence and condition of gratings	
-presence and condition of side shoring	
-presence and condition of blocking of air gaps in the stow and behind side shoring	
-cleanliness of discharge premises	

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Further points of interest

Documents to be attached	
-copy of B/L (both sides)	
-copy of cargo manifest	
-copy of mate's receipt	
-copy of certificate of origin	
-copy of phytosanitary certificate	
-copy of letters of protest	
-copy of sea protest	
-copy of commercial invoice	
-copy of document validating the sound market value of the goods	
-copy of packing list	
-copy of carriage instructions	
-copy of temperature records, recording discs (partlow), other temperature records	
-copy of comparative seal discrepancy	
-copy of charter party	
-copy of statement of facts	
-copy of notice of readiness	
-copy of ship's deck log book	
-copy of ship's engine room log book	
-copy of relevant scrap notes	
-copy of statements	
-copy of relevant ship's certificates	
-photographs taken by other parties	
-set of photographs	

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Appendix no. 1

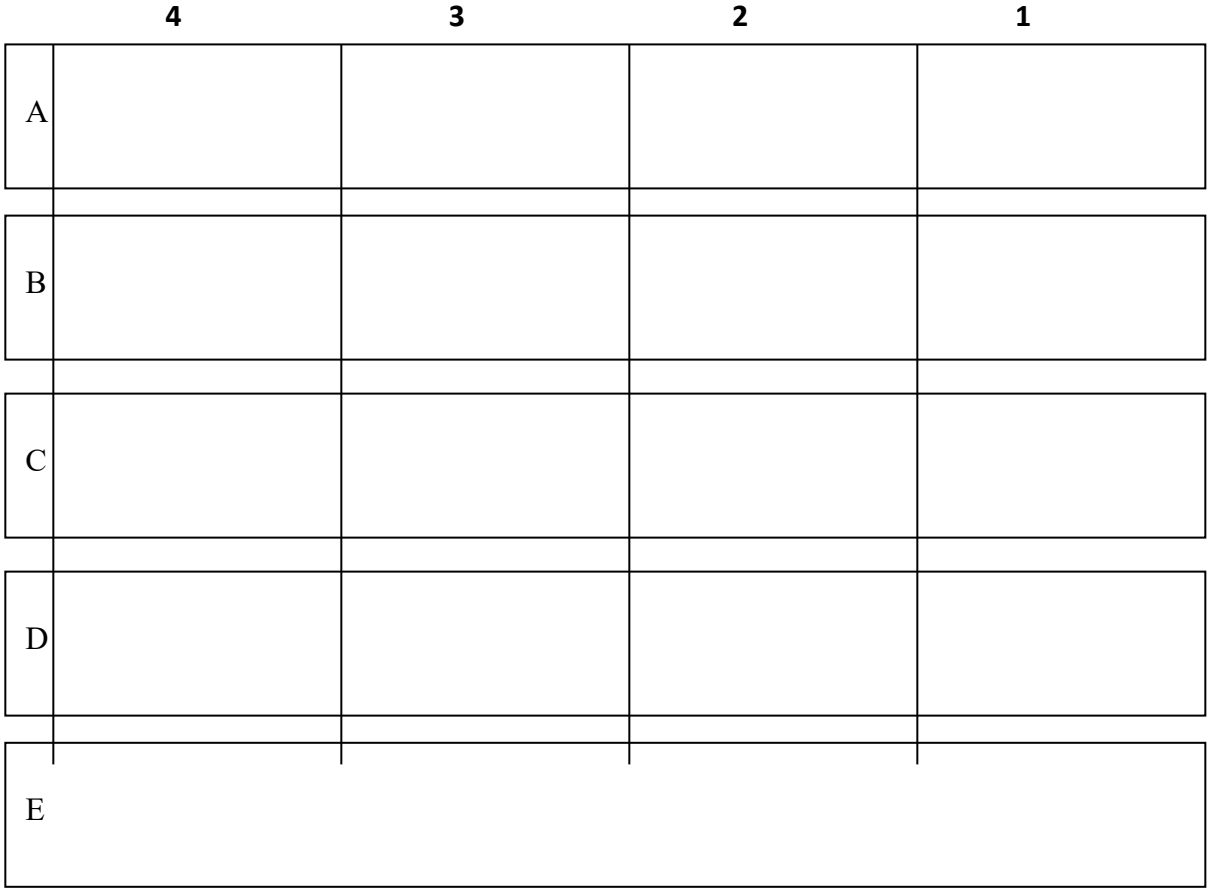
General arrangement and stowage

	4	3	2	1
A				
B				
C				
D				
E				

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Appendix no.2

Refrigeration arrangement and airflow



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Appendix no.3

Date, time and parameters in each individual compartment after final closing in loading port							
Compart-ment	Date / time	Delivery air temp	Return air temp	Space temp	CO_2 %	O_2 %	

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Appendix no.4

Reduction period									
Compartment	First recorded temperature after final closing				End of reduction period				Duration of reduction period(hours)
	Date	Time	Delivery air	Return air	Date	Time	Delivery air	Return air	

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Appendix no.5

Date, time and parameters in each individual compartment before opening in discharge port							
Compart-ment	Date / time	Delivery air temp	Return air temp	Space temp	CO_2 %	O_2 %	

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Narrative

The aim of this form is to obtain a uniform and comprehensive reporting format and at the same time it is an aide memoir for the surveyor. The questions should be answered as much as possible but at the same time it is to be considered that the questions to be answered should be in relation with the claim or survey on hand. In the block "further points of interest" there is room for additional observations or remarks.

General arrangement

Appendix no.1 can be used for indicating the number of holds and the number of decks as well as for the capacities and dimensions of the compartments.

Most of the reefer ships have hydraulic operated folding hatch covers, however, other ships have single wire pull hatch covers and older ships may have insulated pontoons.

Nowadays most of the ships have so-called "warkaus" gratings which are sheets of perforated multiplex of approx. 1X1 meter. Another type of grating uses perforated sheets of moulded aluminium.

The cargo gear is cranes or derricks. Some ships have additional pallet cranes. These cranes are restricted in load but have a higher working speed.

Refrigeration arrangement

The most common refrigeration machineries work on refrigerants like freon. These machineries are of the direct expansion type; the evaporators are present in the cargo compartments.

Other ships have machineries with brine as cooling intermediate. The evaporators, with which the brine is cooled, are outside the cargo compartments. The brine is circulated through pipes inside the cargo compartment in the circulating airflow.

The most common type of air circulation is that the cooled air (after having passed the evaporator) is introduced into the cargo compartment in the forward or aft end (at some ships in the forward end as well as in the aft end) under the gratings from side to side. The cooled air is forced through the cargo and removed from the compartment via gratings along the ceiling at the same end of the compartment where the cooled air was introduced.

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Some ships have a Robson type of air circulation. With this type the air is introduced into the compartment over its full length at port and starboard side under the gratings. After having been forced through the cargo the air is removed via gratings along the ceiling of the compartment.

Appendix no. 2 can be used to indicate the location of the machinery of refrigeration machinery and the direction of the circulation airflow as well as to show the location of the insulated decks.

Loading particulars

This block is to indicate the Port arrival and berthing times as well as the times of each loading (discharging) period for each compartment. Furthermore all relevant details about the loading can be recorded.

Condition of cargo

This block is for the description of the particulars of the cargo and in particular about the condition of it. The most common type of packaging is open folded cartons made of cardboard, but also telescopic cartons are used, in particular for bananas.

There is also room to indicate whether the condition of cargo of a specific grower, packing date, etc. differs from the cargo of other growers, packing dates, etc. Also the position in the compartment of the cargo concerned is of importance as well as whether the condition of the cargo on the individual pallet is uniform.

It should be considered that most of the shore-based cargo pre-cooling units are on horizontal airflow. Also the packaging (position and number of air slots) is mostly on the basis of horizontal airflow.

In this block there is also room to describe the pallet load, i.e. the number of packages per layer and also the number of layers of packages. Also the construction of the pallet load is to be mentioned, such as (but not restricted to) whether sheets of cardboard or other material are present between the layers or on the top of the pallet load and whether the layers of packages are full, i.e. no chimneys present in the centre of the pallet load.

Further points of interest

This block can be used for all particulars which are considered to be of importance or of interest in connection with the subject matter. Some further points of interest are;

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Load readiness

Investigate all fittings in good condition – gratings, side shoring, lighting, ladders, access openings, cooler room doors, hatches operable and water tight with no hydraulic leaks, plugs fitted as necessary at access hatches, or as required by the ventilation arrangements, drains, scuppers and bilge wells, compartments be odour free (low temperatures mask odours), no remnants of previous carried cargoes.

Instrumentation

Investigate last calibration in ice (each voyage) and last electronic calibration (each docking or as required). Inspect data loggers and printouts working properly. Coloured trace recorders to be properly supplied with ink. Also check for slackness in the pen drive wire which should be tight.

USDA equipment

Not recommended for use if USDA not fully certificated as for a USDA voyage.
Note that these fittings are at the ships side or on the deck head where there is a strong airflow, sometimes without a box cover. Due to the strong airflow, the temperatures are likely to be significantly higher in the cargo than recorded by the nearby USDA sensor not placed within the cargo itself.

Pre-cooling

Investigate details of pre-cooling and compliance with instructions.

In the event that pre-cooling is not completed in time for loading bananas or exotic fruits as required by the carriage instructions, and providing the plant is fully operable and the shippers issue full indemnities in agreement with owners / operators, it will sometimes be preferable to load the cargo as soon as possible, rather than to leave it in open sheds or transport with no cooling.

Special attention is to be paid to the time of loading of (for example) bananas and thus the time that the fruit is exposed to the cooling down temperature being lower than the carriage temperature.

Carriage instructions

Investigate crew understanding the carriage instructions and any ambiguities or errors. Were the carriage instructions available for all relevant officers / engineers? ICCT guidelines on carriage instructions are available at www.crtech.co.uk/ICCT

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Pulp temperatures

No average temperatures to be reported, unless the maximum and minimum temperatures are mentioned as well as the tenor of the differences.

The voyage

The voyage begins for each compartment on final closing at the load port where after the data logger will record the compartment air circulation delivery and return temperatures, CO_2 content and humidity (also CA parameters) every four hours.
Normally the plant will produce 90 air circulations per hour at full speed (by volume of empty hold space). Usually the cooler rooms will be inspected once or twice daily for the purpose of taking manual temperatures of the cargo in the hold through the cooler room access doors. Also CO_2 and humidity can be examined at the same time if required.

Investigate if fixed equipment (hot gas for example) has been used for defrosting. If manual defrosting has been carried out find out why. Check the dimensions / construction of the drain pan under the evaporators and was crew in attendance in cooler rooms to observe the defrost operation and to see to it that the drain pan did not overflow into cargo compartment.

Fresh air ventilation

Where applicable control of the fresh air ventilation is equally important as the air circulation and requires proper attention. Fresh air may be bled into the air circulation as required. For frozen cargoes and some groundnuts fresh air is not required and the circulation fans and fresh air ventilation should both be shut off as stated in the carriage instructions.

Fruit and vegetable cargoes are nearly always ventilated (as well as being cooled) to reduce the ethylene gas produced, (as reflected by the CO_2 content), which is detrimental to the condition of the produce and in the case of fruit may lead to early ripening.

Fresh air ventilation can be controlled generally between the 2 – 6 changes per hour (by volume of empty hold space) utilising the fan speed and adjustment of fresh air ventilation flaps which can be opened and closed according requirements.

In colder weather there may be a conflict between the need to maintain circulated air delivery temperatures and the need to ventilate and to introduce cold fresh air.

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Air circulation fans are normally run on the specified speed. It is a good idea to check the remote fan switches in the deckhouses personally when possible.

Any difficulties with the operation of the air circulation of the fresh air ventilation systems or with the maintenance of temperatures should be reported to all parties.

Arrival discharge port

For vessels discharging under survey it is customary for the surveyor to visit all the cooler rooms in turn to take temperatures and other details prior to discharge commencing.

In addition the surveyor may wish to see the data logger before all the circulation fans are switched off.

Discharging

Care of the cargo and cargo records should be carried out as if the vessel were at sea.

Tight stowage

It is the ship's responsibility to supervise the loading and discharging of the cargo for the purpose of maintaining a tight seaworthy stow and to prevent or minimise any shifting damage, tight stowage also being necessary to maintain proper air circulation. For these purposes it is necessary to visit working compartments at frequent intervals and to point out any problems to the stevedore foreman.

When necessary protests should be made in writing to the ship's agent and the stevedores, with instructions to the agent to forward the stevedores copy to the stevedore on board and to their management on shore as soon as possible.

Refrigerated container / trailer

Basic information	
- party inviting for survey	
- name of surveyor of inviting party	
- date(s) and time(s) that survey was performed	
- location of survey	

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- container number	
- type of container	
- date of manufacture	
- make, type, serial number and date of manufacture of refrigeration machinery	

Particulars about the carrying period	
- name of first loading vessel and voyage no.	
- port of loading	
- date of loading	
- transhipment port(s)	
- vessel(s) receiving, voyage no(s)	
- date of transhipment(s)	
- discharge port	
- name of discharging vessel and voyage no.	
- date of discharge	
- final destination	
- date of container delivery	
- stowage position(s) on ship(s)	
- date and place container stuffed	
- transport from port terminal, mode, duration, when on refrigeration	
- date, place and time container unstuffed	
Cargo particulars	
- b/l number	
- b/l place and date of issue	
- type of b/l	
- description of commodity	
- marks and numbers	
- shippers	
- consignee	
- notify address	

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Condition of cargo (can be simplified for non-respiring cargoes**)**	
- details of the commodity involved (variety, count, number per package)	
- description of package	
- marks and numbers of packages	
- picking and packing dates	
- name of grower/packing station	
- other codes on packaging	
- details of any carton seals	
- description of condition of the cargo	
- number of cartons on the pallet	
- were carton ventilation holes aligned properly	
- condition of packaging	
- construction of pallet load	
- difference in condition when considering grower, picking date, packing date, variety, count, location on pallet, location in container	
- history of commodity before loading	
- details of thermometers used at survey and of calibrations	
- records of temperatures including locations and measurement methods	
- ambient/store temperatures at survey	

Particulars about the stowage of the cargo in the container	
- how was cargo stowed in the container	
- was dunnage present	
- was entire T-bar floor of container covered with cargo	
- was top of stow below maximum loading level (red line)	
- were photographs taken of the stowage	
- was there air space between cargo and doors	
- were “ventilation slots” of dry van	

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containers unobstructed	
- was cargo secured in container (how)	
- was there any cargo movement in transit	
- have USDA sensors been used in the cargo	
- were cargo data loggers/recorders present	
- have USDA sensors been calibrated If so, give details	
- is this type of container appropriate for the present shipment	

Particulars about the container	
- temperature setting	
- fresh air vents open/closed, if open what amount (cu.m. per hour, or %)	
- humidity setting	
- controlled atmosphere (CA) settings	
- method of CA (Transfresh or other)	
- is unit equipped with temperature recording disc (Partlow), was a copy taken	
- is unit equipped with data logger	
- has data recorded during carrying period been retrieved	
- if survey is from container, how long was the container off power before survey	
- where was container stored before survey	
- are hazardous/odorous materials present	
- during breaks in unstuffing, were doors closed, was refrigeration on	
- unstuffed in open or in store or on bay	

Inspection of the container	
- condition of exterior of container	
- condition of door seals - is light visible from inside closed container	
- were seals broken in your presence - were locking bars correctly secured	

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- seal number(s)	
- condition of interior of container (position of hinge plate)	
- are delivery and return air channels free (not blocked)	
- number of, position of and condition of drains in corners of container, whether open or not	
- is drain of drip tray under evaporator open	
- working condition of machinery including sight glass level	
- air circulation fans working properly	
- is delivery air introduced over full width of floor	
- are displayed temperatures in accordance with actual temperatures (check with calibrated thermometer in delivery/return air flows)	
- water level in tank for humidity control	
- cleanliness of container	
- when/where was last Pre-Trip Inspection	
- temperature according to recording chart	
- temperatures according to data logger	
- alarms during carrying period	
- have stoppages of machinery occurred	
- have repairs been carried out	
- Pre-Trip Inspection after subject carrying period	

REFRIGERATED TRAILERS – additional points	
- type of trailer and manufacturing date	
- registration / licence plate	
- chassis number	
- owner of trailer	
- ATP class/date	
- general arrangement of interior of trailer	
- make, type and i.d. number and manufacturing	

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date of refrigeration machinery	
- maintenance records	
- have repairs been carried out	
- condition of interior/exterior of trailer and refrigeration machinery	
- setting of temperature	
- position of fresh air opening if any	
- temperature logging system	
- had machinery been working continuously	
- number of running hours at time of stuffing of trailer	
- number of running hours at time of survey	
- temperature of the cargo	
- condition of the cargo surveyed as above	
- packaging at time of survey	

Claims summary	
- nature of consignee complaint	
- name of complainant	
- is there a record from a customer datalogger	
- who caused the damage or loss	
- where did the damage or loss take place (before, during or after carriage)	
- in whose custody was container when the damage or loss took place	
- has the “causal” party been held responsible/liable	
- if the loss took place on board a ship did the Master issue Sea protest, report, etc.	
- have cargo quality tests been carried out, if so with what results	
- estimated sound market value of the cargo (c.i.f./f.o.b.)	
- estimated depreciated value of the cargo	

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- estimated total extent of the claim	
- details of agreed depreciations	
- cargo condemnation certificates if issued	

Further points of interest

Documents to be attached	
- copy of B/L (both sides)	
- copy of certificate of origin	
- copy of phytosanitary certificate	
- copy of letters of protest	
- copy of commercial invoice	
- copy of document validating the sound market value of the goods	
- copy of packing list	
- copy of carriage instructions	
- copies of container interchange receipts	
- copies of ships' loadplans	
- copy of temperature records, recording discs (Partlow), other temperature records	
- copy of comparative seal discrepancy	
- photographs taken by other parties	
- set of photographs	

Narrative

The aim of this form is to obtain a uniform and comprehensive reporting format and at the same time it is an aide memoir for the surveyor. The questions should be answered as fully as possible but at the same time it is to be considered that the questions to be

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answered should be in proportion to the claim or survey on hand. In the block “further points of interest” there is room for additional observations or remarks.

Considerable detail is included for live (respiring) cargoes, which will not be necessary for “dead” cargoes (e.g. confectionery, pharmaceuticals, etc.).

PART 4. BULK CARGOES.

4.1 - BULK DRY CARGO

During the course of your career you may be instructed by owners, charterers, or cargo interests to board a bulk carrier or similar type vessel to inspect a bulk type cargo such as fertiliser, grains or animal products.

The type of survey could range from a quality complaint, water ingress damage, cargo sweat and condensation, self-heating etc. Each cause requires differing investigations.

For example, when investigating water ingress damage you would be reviewing the deck and engine log books and inspecting the hatch covers and the closing mechanism (assuming that water had entered from the top of the hold) and the bilge system/ballast arrangement if cargo was wetted adjacent to the tank top.

Candidates should be familiar with the contents of International Maritime Solid Bulk Cargoes Code (IMSBC code) not only the details of the cargoes contained therein, but also the general provisions, precautions and the safety advice.

In addition to the contents of the IMSBC code, candidates should be familiar with the contents of the Code of Practice for the Safe Loading and Unloading of Bulk Carriers (the BLU Code), 2011.

Candidates should also be familiar with cargo ventilation practices and cargo and ship sweat (see again section 2.10).

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4.2 - BULK LIQUID CARGO

Bulk liquid cargoes and the inspection thereof are far more rooted in technical knowledge and standardised processes than is the case with general cargo. The surveyor needs to be conversant in the standards applicable to the commodity concerned.

Whether you are involved with the bulk edible oil trade or petrochemicals, there will be some similarities in the handling, carriage, sampling and testing of the cargo. However, it is not a simple thing to transfer knowledge and working practices from one industry to the other and assume that, for instance, exactly the same methods of sampling might apply. For instance, when sampling edible oils, glass containers should not be dipped into the storage units or tanks – for the obvious reasons of preventing contamination by glass fragments. This is not an issue with most petroleum liquids. However methods of measuring ullage spaces and temperatures will be similar across the industries.

The term 'Bulk Liquids' covers a number of different commodities:-

- Crude Oil
- Hydrocarbon Products
- LNG/LPG
- Bulk Chemicals
- Bio Fuels
- Edible Oils

The standards are varied and comprehensive and the reference details are forever changing.
Therefore it is essential that the surveyor research what are the current standards in force for a particular operation and commodity from the internet or technical journals. Candidates choosing to take the bulk liquids paper in their examination will be tested on their knowledge of contemporary standards and practices.

Bulk Liquid Inspection practice is governed by various standards including those produced by the following organizations:

- American Petroleum Institute (API)
- Energy Institute (EI)

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- Chemical Industry
- ISO
- Federation of Oils, Seeds and Fatty Acids (FOSFA)

Whichever industry the surveyor is involved with he/she should have a working knowledge of the various practices involved. These standards are issued primarily to Inspection Companies who are involved in Quantity and Quality inspection and certification, the practice of which is not the remit of BACS.

Safety

All surveyors involved with petroleum should have a working knowledge of the International Safety Guide for Tankers and Terminals (ISGOTT) published by OCIMF. Only intrinsically safe equipment should be employed with petroleum liquids, LPG and LNG cargoes, chemicals, as laid down in ISGOTT. The strict guidelines in Section 11 in ISGOTT for Entry into Enclosed Spaces should be followed whatever bulk liquid industry you are operating in.

Reasons for survey

The appointment of an insurance surveyor with respect to bulk liquid cargoes would most likely be either for investigating an allegation of a shortage and/or contamination claim in which case the surveyor's duties will be in the protection of Principal's interests, to determine cause, nature and quantum of loss.

A surveyor might also be appointed as a Superintendent in a Loss Control capacity or with giving advice on Loss prevention measures for a particular consignment.

Whatever the case the Surveyor should acquaint him/her self with the custody transfer arrangements between ship and shore at both the load and discharge ports, including matters of cargo integrity especially where contaminations are concerned.

The following are a list of important stages and procedures of a custody transfer relating to a typical shipment with some of the likely operations or areas of concern when assessing shortages and/or contaminations:-

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Pre-Loading

Vessel

- Tank cleaning history and last three cargoes
- Shore/line/ship samples – analysis.
- Quality specification.
- Integrity of cargo at all stages of the loading.
- Vessel type
- Integrity of openings
- Heating arrangements (last pressure test)
- Tank coatings etc.

Shore tanks

- Pre-load condition of cargo
- Shore tanks nominated
- Method of sampling and analysis of the product to be loaded.
- Was the cargo on specification to start with?

Shore Lines

- Shore pipelines to be used
- Segregation – what was the last product in the line?
- Line preparation i.e.,cleaning
- Line fullness check.

Loading – Quality concerns

- Segregation on board
- Valve line-up ashore.
- Confirming quality – by 'first foot' sampling.
- Final sampling tank by tank and ship composite sampling.
- Use of auto in-line samplers and performance criteria of the same.
- Certificate of Quality – how was it derived.
- The effect of accurate sampling and analysis procedures for sulphur and water determination (crudes).
- Varying methods of determining the Bill of Lading (Gross & Nett) by shore tank measurement, meters or ship figures.

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- Ullaging, accuracy of.
- Effect of sea condition, trim, list etc.
- Temperature profiles and the effect of any temperature inaccuracy on quantity assessment.
- Different volume reduction tables used throughout the world.
- Predominantly sale and purchase is on volume (bbls or barrels) for crude oil, in volume (cubic metres) for LNG/LPG and metric tonnes (air or vacuum) for products/edible oils and chemicals. Thus essential to know which conversion factors and Volume Correction tables were used at the load and discharge terminals for the commodity concerned. These standards will be set by the Country of shipment and the operating Terminal at the locality. For petroleum most will apply ASTM/API/EI industry standards but some may still have their own standard temperature for calculations as dictated by the local Customs authorities.
- When doing an investigation on shortage after the event then the local Inspectors report should be requested from your Client in order to determine methods of calculation.

Voyage conditions

- Weather /sea conditions during voyage. – in/transit quantity/quality differences.

Pre-discharge cargo inspection

See "Load – Quantity concerns" above regarding variations in quantity assessment throughout the world. The methods of measurement, sampling and analysis as performed by the cargo inspector and the affect upon the custody transfer.

Vessel

- Shore/line/ship samples – analysis.
- Quality specification. integrity at all stages of the discharge.
- Cargo measurement and calculation.
- Shore tanks
- Pre-filling condition of shore tanks nominated, method of sampling and analysis of the product already contained in the shore tanks (heel). Check specification.

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Shore Lines

- Shore pipelines to be used – segregation, last product quality, line preparation i.e.,cleaning and ,line fullness check. If auto-sampler installed confirm cleanliness of receptacle.

During Discharge

- Line displacement procedure (checking line fullness).
- Ship/shore differences during discharge.
- If crude oil cargo – was Crude Oil washing (COW) performed?
- Check on COW recommendations for this cargo.
- Continued heating of the cargo, where applicable.

Stripping/ROB

- Stripping capability.
- Type of pumps.
- hip pipeline draining. What checks made?
- Measurement of ROB (number of dipping points).
- Calculation of ROB. (Trim, calibration tables, wedge formulae etc)

Shore Tank Measurement

- Floating or fixed roof types.
- Measurement criteria between auto/manual methods.
- Restrictions in measurements when roof grounded or in critical zone.
- Be guided by comprehensive information on shore tank measurement issues in EI Guidelines.
- Shore Tank heating/insulation capability.

Outturn

- How assessed?
- Shore tanks, ship delivered figures (VEF adjusted) or meters (limited places).
- The effect of accurate sampling and analysis procedures for S & W determination (crudes).

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Cargo worthiness of carrier

You might be requested to give your opinion as to the cargo carrying condition of the vessel. Basic seaworthiness might be an issue such as the integrity of tank hatches and ullage ports. What are the cargo heating arrangements? Following the voyage ensure you obtain a cargo heating Log. Be careful to note pumping & piping arrangements, stripping performance of the vessel, tank coating condition etc.

Loss prevention

Where applicable, give the client recommendations as to future action and carriage of similar goods.

Essential reading:-

For Petroleum

Energy Institute – A whole range of guidelines produced by the Hydrocarbon Management Committee (HMC) and listed on their website: http://www.energyinst.org

Due to the vast number of documents available questions for the BACS exam questions (re: petroleum) will be limited to HM 28, Procedures for oil cargo measurements by cargo surveyors. Section 1: Crude oil.

For Chemicals

Energy Institute (as above) for the BACS exam questions (re: chemicals) will be limited to HM 51, Manual of Petroleum Measurement Standards, Procedures for bulk liquid chemical cargo inspections.

For Edible oils

FOSFA (Federation of Oils, Seeds and Fats Association) Regulations and associated literature – basic understanding of FOSFA & ISO Regulations. http://www.fosfa.org/

Many of these documents/standards are regularly updated and new standards for relatively new commodities are being produced i.e. for bio-fuels. It is down to the surveyor to keep him/her self abreast of new developments.

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Further Recommended Reading

As indicated previously measurement practice is very much supplier orientated, but one can be guided generally with regards to safety and handling guidelines by certain chapters within ISGOTT, and other EI Standards. Other essential reference information:-

- Dangerous Substances and Explosive Atmospheres Regulations (DSEAR),
- Health & Safety Executive documents relating to the Control of Substances Hazardous to Health (COSHH) or Material safety data sheets (MSDS) http://www.hse.gov.uk/coshh/basics/datasheets.htm.
- For chemicals also refer to CHIP and CLP Regulations.
- The Rapid Guide to Hazardous Chemicals in the Workplace by Lewis,
- Dangerous Properties of Industrial Materials, by Sax.
- The Shipment of Edible Oil Cargoes by K.T.H. Farrer.

PART 5. DANGEROUS GOODS AND THE IMDG CODE.

5.1 – INTRODUCITON

Some materials shipped as cargo may be dangerous to the vessels or vehicles that carry them, to people (whether involved in carrying or handling them or not) or to the environment.

In the modern logistics environment, where most cargo travels in containers or on a number of conveyances between origin and destination, it is vital that there should be a common agreement on what constitutes a hazardous material; exactly what the hazards are; how the material is to be declared and identified as hazardous; how it is packed, handled and stowed in order to mitigate the risk of a leakage or other accident.

The International Maritime Dangerous Goods (IMDG) Code was developed as a uniform International code for the transport of dangerous goods by sea covering such matters as packing, container traffic and stowage, with particular reference to the segregation of incompatible substances. Candidates should have a good knowledge of this publication.

The development of the IMDG code dates back to the 1960 Safety of Life at Sea conference, which recommended that Governments should adopt a uniform

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international code for the transport of dangerous goods by sea to supplement the regulations contained in the 1960 International convention for the Safety of Life at Sea (SOLAS). The 2024 Edition is the latest edition of this publication.

A resolution adopted by the 1960 conference said that the proposed code should cover such matters as packing, container traffic and stowage, with particular reference to the segregation of incompatible substances.

A working group of IMO's Maritime Safety Committee ("MSC") began preparing the Code in 1961, in close co-operation with the United Nations Committee of Experts on the Transport of Dangerous Goods, which in a 1956 report had established minimum requirements for the transport of dangerous goods by all modes of transport.

Since its adoption by the 4th IMO Assembly in 1965, the IMDG Code has undergone many changes, both in appearance and content to keep pace with the ever-changing industry needs. Amendments that do not affect the principles upon which the Code is based may be adopted by the MSC, allowing IMO to respond to transport developments in reasonable time.

Amendments to the IMDG Code originate from two sources; proposals submitted directly to IMO by Member States and amendments required to take into account of changes to the United Nations Recommendations on the transport of dangerous goods which set the basic requirements for all transport modes.

Amendments to the provisions of the United Nations Recommendations are made on a two-yearly cycle and approximately two years after their adoption, the authorities responsible for regulating the various transport modes adopt them. In that way a basic set of requirements applicable to all modes of transport is established and implemented, thus ensuring that difficulties are not encountered at intermodal interfaces.

For the purpose of the Code, dangerous goods are classified in different classes, to sub-divide a number of these classes and to define and describe characteristics and properties of the substances, material and articles that would fall within each class or division. General provisions for each class and division are given. Individual dangerous goods are listed in the Dangerous Goods List, with the class and any specific requirements.

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In accordance with the criteria for the selection of marine pollutants for the purposes on Annex III of the International Convention for the Prevention of Pollution from ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78), a number of dangerous substances in the various classes have also been identified as substances harmful to the marine environment (MARINE POLLUTANTS).

5.2 RESPONSIBILITIES / CLASSIFICATION

The classification shall be made by the shipper/consignor or by the appropriate competent authority where specified in this Code.

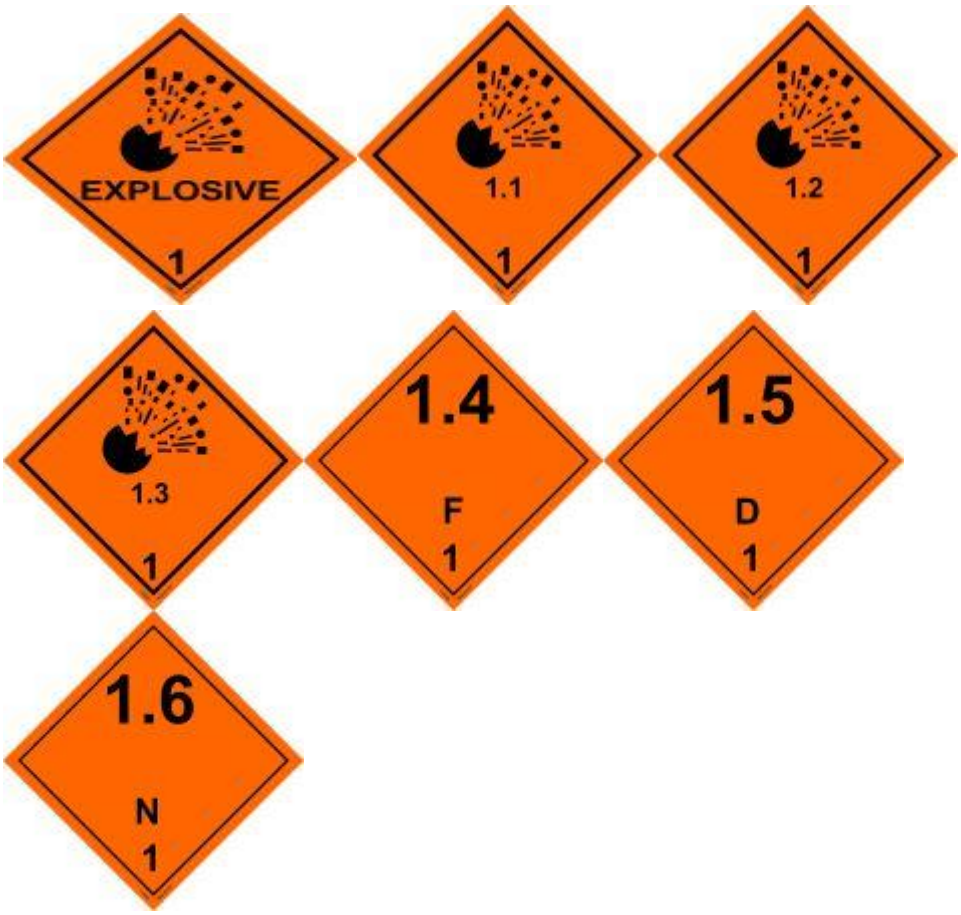
Classes, divisions and packing groups.

Substances (including mixtures and solutions) and articles subject to the provisions of this Code are assigned to one of the classes, Nos. 1 to 9 according to the hazard or the most predominant of the hazards they present. Some of these classes are sub-divided into divisions. These classes or divisions are as listed below:-

Class 1: Explosives.

Division 1.1: substances and articles that have a mass explosion hazard.
Division 1.2: substances and articles which have a projection hazard but not a mass explosion hazard.
Division 1.3: substances and articles that have a fire hazard and either a minor blast hazard or minor projection hazard or both, but not a mass explosion hazard.
Division 1.4: substances or articles which present no significant hazard.
Division 1.5: very insensitive substances which have a mass explosion hazard.
Division 1.6: extremely insensitive articles which do not have a mass explosion hazard.

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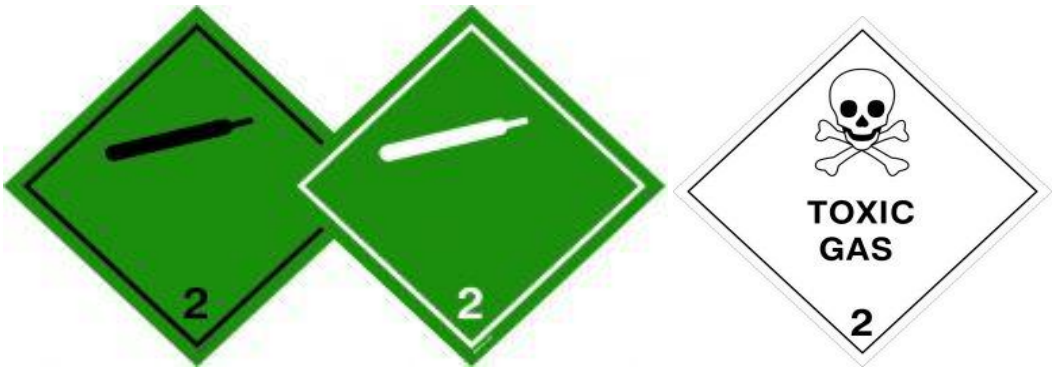


Class 2: Gases

Class 2.1: flammable gases.
Class 2.2. non-flammable, non-toxic gases.
Class 2.3: toxic gases.



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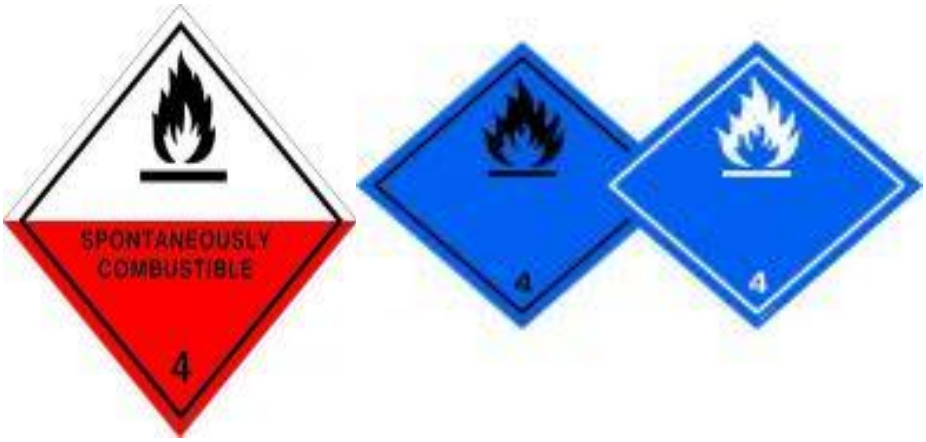
Class 3: Flammable liquids.



Class 4. Flammable solids; substances liable to spontaneous combustion; substances which, in contact with water, emit flammable gases.

Class 4.1: flammable solids, self-reactive substances and desensitized explosives.
Class 4.2: substances liable to spontaneous combustion.
Class 4.3: substances that in contact with water emit flammable gases

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Class 5: Oxidizing substances and organic peroxides.

Class 5.1: oxidizing substances.
Class 5.2: organic peroxides.





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Class 6: Toxic and infectious substances.

Class 6.1: toxic substances.
Class 6.2: infectious substances.





Class 7: Radioactive material.







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Class 8: corrosive substances.



Class 9: Miscellaneous dangerous substances and articles.



Class10: Marine pollutants.



Many of the substances assigned to classes 1 to 9 are deemed as being marine pollutants. Technically, the correct term is now Environmentally Hazardous Substances as they are hazardous to all water systems not just the marine environment.

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5.3 - PRACTICAL IMPLICATIONS FOR THE SURVEYOR

In accordance with the IMDG code, all goods that are defined as hazardous must be declared to the carriers. The dangerous goods declaration is a document that travels with the cargo and some essential information is repeated on the accompanying Bill of Lading or other transport document.

The declaration will state the material's **UN Number –** this is a standard number by which individual substances or types of substances are referenced in the IMDG Code. That number can be located in the code and the entry will state the name of the material, the hazards associated with it, the packing and segregation requirements and some basic directions about how to handle it and deal with it in the event of a leak, spill or other emergency.

The declaration will also state the producer of the material and details of how to contact the producer for advice and guidance in the event of an emergency.

Finally, the accompanying papers for the cargo will also include and **MSDS Document,** which is a Material Safety Data Sheet. This is a document that the manufacturer must produce, which describes very fully the material, it's chemical and physical properties, its hazards, exactly how it should be handled in a range of emergency situations and what protective equipment and measures must be taken by any person interacting with the material. Please note that moves are afoot to rename this document as an Safety Data Sheet (SDS) as "Materials" implies a solid product whereas many are liquid products.

MSDS documents are normally found easily on the website of the manufacturer or in free online databases of documents such as SDS Database | 13Million | SDS Sheets Online | MSDS Search | MSDS https://sdsmanager.com/eu/search/online free

The surveyor, as soon as they become aware of the presence of hazardous material, should request its Dangerous Goods Declaration and MSDS so that they are aware of the basic personal safety and protection issues. If the material has leaked, spilled or been compromised, careful consideration must be given to the question of how to approach the unloading, inspection and handling of the goods. If no emergency exists, dangerous goods handling contractors can be employed to open containers or other conveyances, assess the condition of the goods, clear up spillages and make goods safe for further handling.

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If an emergency exists – such as leakage, fire or chemical reaction or if the dangerous goods are at risk from a developing external problem such as failure of temperature control; water ingress, fire etc, then local emergency services must be notified. Ordinarily that would be the local fire brigade.

PART 6. GENERAL AVERAGE / PARTICULAR AVERAGE

Where insurance is concerned, and the goods are covered by a marine policy and are carried by a ship then any claim would fall under one of two categories, namely General Average or Particular Average.

6.1 - GENERAL AVERAGE

A "general average" act occurs where any extraordinary sacrifice or expenditure is voluntarily and reasonably made or incurred in time of peril for the purpose of preserving the property imperilled in a common adventure. It is worth stating clearly that the general average act or sacrifice must be one which is made ***deliberately*** with the intention of saving or preserving property.

Examples of a GA sacrifice

(a) To cargo. The ship runs aground at high spring tides and will not float off again at next high tide. The ship must be lightened but it is impractical to discharge cargo into barges. Instead some of the cargo has to be thrown over the side – jettisoned – if the ship is not to break up with a consequent loss of the whole adventure. The shipowner has ground for claiming the cargo loss as a GA sacrifice.

(b) To ship. Some bottom plates are sprung during very heavy weather. The ship takes water too fast for the pumps to cope with. To prevent the ship from sinking in deep water, the master deliberately grounds her in sheltered shallow water where the cargo is safely discharged, temporary repairs are made to the plate and the ship is refloated and reaches safety. Repairing the plates which had sprung because of heavy weather would be treated as particular average. Any damage caused by the deliberate grounding could be a GA sacrifice.

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(c) To cargo. A fire breaks out in the lower part of one of the ships holds. In fighting the fire the crew use hoses but the fire becomes so serious that the master takes the decision to flood that hold to a sufficient depth of water so as to extinguish the fire. The other cargo in the hold which is damaged by fire or by smoke would present particular average losses; however, any cargo which is primarily damaged by the water used in the extinguishing of the fire could be regarded as a general average sacrifice.

(d) To ship. During exceptionally heavy weather or as a result of an entirely accidental and unforeseen loss either of power or of manoeuvring, a ship runs aground relatively lightly on a sandbank. In the opinion of the master the grounding has not caused significant damage and the vessel may well be capable of moving itself off the sandbank without the expensive assistance of tugs or salvors. At the next high tide the vessel is able to work itself off of the sandbank but in so doing damage is sustained to the propeller, shaft and bearings. These damages represent a general average sacrifice whereas any damage to the hull of the vessel in the original grounding would not.

Examples of GA expenditure.

In the example (b) of the paragraphs above, the cost of hiring barges into which the cargo is discharged and have actually discharging the cargo, would constitute GA expenditure. Note, also, that the York-Antwerp rules, a voluntary code adopted almost universally by shipowners throughout the world for the adjustment of general average and specifically referred to in their contracts of affreightment, admits as general average the making good of cargo damaged during loading and unloading if the cost of the actual loading and unloading is itself admitted as general average.

6.2 - PARTICULAR AVERAGE

This relates to specific damage to a cargo arising from an insured peril. It can be an actual or constructive total loss, in which case an insurer will simply pay the agreed, insured value or it can be a partial loss.

A point to remember in the context of partial loss is the situation that can arise when faced with the total loss of an identifiable part of an insured cargo.
Where an identifiable part of a total consignment is totally lost, the loss is treated as a total loss of parts, not a partial loss of the whole. The claim for compensation will be that fraction of the insured value which the lost part forms of the total consignment.

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Example: Four crates are shipped with an insured value (100%) of GBP 40,000. One crate is lost in transit containing one third of the value of the cargo. In this instance the claim will be 1/3 of GBP 40,000 = GBP 13,333 and not ¼.

If goods are delivered damaged at destination then the loss to the cargo owner is the difference between the gross estimated **arrived sound**, and the gross actual **arrived damaged** values of the cargo. This difference will fluctuate according to the state of the market where the values often change quite substantially. Whatever the state of the markets, however, the proportion of loss will be constant because the price realised by both sound and damaged cargo will rise or fall in harmony. The method of assessment of the measure of indemnity for cargo delivered damaged is based on this proportion, known as **the percentage of deterioration**.

Example: 20 sacks are shipped, of which only five are sound on arrival. The consignment fetches a total amount of GBP 10,000 and the five sound sacks sold for GBP 1,000 each. Had all the sacks arrived in sound condition, the total value of the consignment would have been GBP 20,000. Because of the damage the depreciation is GBP 10,000 / GBP 20,000 = 50%

The insured value was GBP 19,000.

Applying the depreciation of 50% to the insured value, the claim against the insurers will be for GBP 9,500

It should be noted that the ***gross*** value is to be used. This is defined as the wholesale price without deduction of any charges, which customarily include landing charges, duty, freight, sale costs and similar items

In practice it is often difficult, when there is a forced sale of damaged cargo at destination, for a fair market price to be established that is not risking underwriters' disadvantage. For this reason, underwriters will prefer the consignee to take delivery of damaged goods and to agree with the surveyor the percentage of depreciation suffered. Every effort should always be made to resolve damage claims in this way.

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PART 7. SURVEY REPORT

7.1 – REPORT

It should noted reports are not always in respect of nature, cause and extent of loss. That being said, this syllabus is geared to the cargo damage survey report.

Whilst most companies have their own reporting style and formats, the manner in which the survey report is drawn up is of paramount importance as it frequently represents the only evidence on which Underwriters and others, far removed from the scene, may have to decide the degree and extent of their liability.

It is therefore essential that the findings should be set out in such a way and in such detail as to present any persons studying the report with the best possible picture.

Special attention should be given when describing whether loss or damage is due to the following :

- Ordinary leakage
- Ordinary loss in weight or volume
- Ordinary wear or tear
- Insufficient or unsuitable packing or preparation of goods (including stowage) by Assured or their representatives into the carrying container (closed)
- Inherent vice or nature of goods

Where a surveyor is instructed on behalf of Underwriters, the report should provide, in order, the following information :

- Detailed description of the interest
- Method of transit i.e. sea, air, road, rail etc
- Name of vessel
- Flight number, if aircraft, etc
- Trailer number / vehicle registration, if road, etc
- Date the carrying vehicle (ship, aircraft, truck) reported at the entry port of receiving country
- Description of the casualty/incident
- Amount claimed or potential reserve or information suggesting the claim is still the subject of negotiation

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- Identification of the Assured

When survey is carried out for 'Account of whom it may concern', additional or different information may be required.

The completion of the report involves not only the incorporation of the physical evidence found but also a history of the movement of the goods to which it relates.

The report should incorporate the transit history of the cargo by tracking and movement from the original supply location until final delivery has been completed. Date and identification of carriers should, if possible, be identified, with the various paragraphs in chronological order. This will lead to better understanding by interested parties.

The report should contain, as far as possible, only statements of fact and should avoid any expression or opinion that is not supported by factual information

7.2 - PHOTOGRAPHS

All photographs taken are in digital media. This brings new challenges in storage and management of images. As a rule, the surveyor should always try to download the images from the camera to a PC at the earliest opportunity – this being a far safer storage medium than the camera and any related data card.

If the surveyor might be away from the office for some time, consider emailing the important images to yourself, or to the office, or upload them safe file storage. In this way the files are backed up and protected against loss or corruption.

In the office, ensure that all photos (and other case-related data files) are backed up regularly.

Photographs are an aid to description of damage and its cause. They are not a substitute for proper inspection, measurement and contemporary survey notes. For instance, impact damage to a large machine needs to be described and its location measured and correlated to the surrounding environment if, for instance, it appears the machine impacted with a part of the ship's structure during loading or unloading. A simple picture of the damage without that wider narrative context is meaningless.

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A close-up image of damage helps understanding of the written report, but is not evidence of cause, time or location – whereas a photo of the damaged thing in a wider view of the hold of the ship does serve to support the contemporary notes or the surveyor's conclusions.

The surveyor must be able to match the photos to the notes. For example: reels of paper all look the same. Cameras will sequentially number the photos, so make a habit of photographing the ID label of each reel first, or alternatively hand-write the ID number on the outside of the reel, adjacent to the damage you are photographing, so it shows in the image.

When photographing a ship's structures, one tank top or pipe looks much like all the others: carry chalk on survey, and use it to mark up structure before photographing them – for instance "6P" or "6S" for hold 6, port/starboard.

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The BACS Committee.

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