Insects occur with abundance in all habitats and it is estimated that they make up three quarters of all species on earth. They breed rapidly and with 1 million different species, they are most diverse and have the ability to adapt swiftly to new conditions. Consequently, prevention and control of insects is at the top of all measures needed to protect our food supply.

Most agricultural products are already contaminated with insects (or insect products) when they are harvested, and still more gain access during storage. If not well taken care of, international transport is an additional mode for the spread and proliferation of insects.

Fumigation is an essential tool to protect your goods. SGS is recognized world wide for their ability to prevent and control insect related risks and damage. With our extensive experience we advise on the best available techniques and procedures to mitigate actual and potential hazards, therefore contributing to the preservation of the quality of agricultural commodities and processed products.

SGS is able to provide tailored solutions and to meet your requirements according to specific needs always in line with local regulations.

Our skilled and mobile teams assure, swift, reliable interventions worldwide and facilitate smooth operations. For transportation or for storage, safety is at the heart of all our interventions.

Judicious use of biocides, ecological product disposal and safe procedures are our keystones of risk prevention and residue control.
Post harvest insect pests threaten stored and transported grain and produce, wood structures and installations in the food and feed industry. They give rise to quality deterioration, health and safety risks, organoleptic change and general damage to goods. It is estimated that post harvest losses due to insects amount to dozens of billions dollars per year.

Fumigation is a common method to control and eradicate insects pests and makes use of a gaseous compound that diffuses homogenously throughout the treated object and penetrates well in stored goods. Upon contact with the fumigant, all stages of the lifecycle of insects – egg, larvae, pupae and imago - are eradicated through intoxication.

Worldwide, only a limited number of molecules are available for fumigation: mainly phosphine, methylbromide and sulfurylfluoride.

The regulations related to fumigation are mainly dependent on the type of application. A fumigant applied must be registered or authorized in the respective country for the relevant application: treatment of stored grains, wood boring insects, fumigation of mills and structures, termite treatment, etc. Regulations vary between regions and countries and are sometimes determined by international agreements such as the Montreal Protocol. The requirements related to international trade of wood packaging materials are laid down in the ISPM15.

Shipped agro commodities can be treated in accordance with the guidance of the International Maritime Organization (IMO) or GAFTA protocol. In order to secure safety, multimodal transport of goods must be in accordance with IMDG code.

A fumigant gas that today is commonly used in stored commodities – and virtually the only fumigant available for this type of application - is phosphine. It is generated in situ by introducing (metalphosphide) tablets or pellets in the cargo. Upon reaction with ambient moisture, phosphine gas will be gradually released and diffuse through the cargo up to a depth of approximately 8 m, depending on the conditions. To improve and speed up diffusion, forced recirculation can be used.

Benefits of recirculation include a more homogeneous gas concentration throughout the cargo, a shortened fumigation period and accelerated ventilation at arrival, thus avoiding a delay of discharge.

Although widely applied, phosphine has nevertheless some important concerns on effectiveness and potential. If good fumigation practices are not maintained, tolerant insects will be the eminent result. Recent observations have revealed that tolerance is rapidly increasing, therefore possibly compromising the future use of phosphine.

Since 1985, the convention of Vienna and The Montreal Protocol ordered research and measures to reduce substances that are detrimental to the ozone layer. Methylbromide (used for fumigation of mills, silos, buildings and in many regions for the fumigation of commodities) was identified as an ozone depleting molecule. Since then its use was gradually restricted and today it is not authorized anymore in many regions.

With the adoption of the Montreal Protocol, the search for alternatives began. Sulfurylfluoride, that had been successfully used for termite control in wood, was re-evaluated as an alternative for post harvest insects. Today it is registered in various countries for fumigation of mills, warehouses and storage structures. In addition, it was registered in some countries for treatment of nuts, dried fruits and cocoa. In Australia a registration for fumigation of grains was obtained to help prevent resistance issues with other fumigants and insecticides.

Today, fumigation is the single method to provide accurate control of post harvest loss. Only when the highest execution criteria are respected, current methods will remain available as an effective and accurate tool. The registration of new molecules and applications remains challenging and narrowly focussed.

SGS will take care of your application with attention to a correct planning, diligent application and thorough safety measures.
Almost 150 years ago Darwin formulated the blueprint for life in all its diversity: the survival of the most adapted was evident. This struggle for adaptation is the engine of a never ending story of evolution, change and disappearance of species. One can be curious how life will look like in the far future. Unlike mammals, insects (characterized by a very short lifecycle and rapid propagation) can develop genetic change - or better genetic selection - on a relatively short time scale; insects could become resistant against control methods such as fumigation.

Insects have developed resistance against a wide range of insecticides, but also against phosphine, the most commonly used fumigant in stored and shipped agricultural commodities. An extensive study in Australia showed that at the end of the 1990’s weak resistance had already spread widely with almost half of the samples collected from stored commodities containing insects with weak resistance to phosphine. More alarming, however, was the observation during the first decade of this century of strong resistance emerging in several species: the lesser grain borer (Rhizopertha dominica), the rust-red flour beetle (Tribolium castaneum), the saw toothed grain beetle (Oryzaephilus surinamensis) and an extremely strong level of resistance in the flat grain beetle (Cryptolestes ferrugineus).

Resistance can be explained by natural instability of the insects’ genome and by the great reproductive capacity of most species. Any given population of insects could become resistant against a chemical if they are repeatedly exposed to inadequate (sub-lethal) concentrations. As soon as one insect in a colony has become resistant, its offspring will become dominant and spread rapidly in the population due to its advantageous adaptation and spread rapidly.

Although it is believed that resistance was originally developed in South East Asia Pacific, resistant insects are today a global threat to trade of agro commodities. Repeated fumigation in poorly managed warehouses and inadequate sealing/gas tightness preparation has undoubtedly been the trigger for resistance development. Whilst resistance has been observed for some time, rapid and global spreading is now occurring at a much faster pace due to the absence of alternative fumigants for insect control. Indeed, until 2005 many commodities were fumigated pre-shipment, or in case of suspicion of resistance, with methyl bromide. Because of its phase out in line with the Montreal Protocol, stakeholders in the food and feed supply chain have been confronted with the disappearance of the limited alternatives for insect control in bulk commodities. Additionally, we are on the brink of high resistance to phosphine.

This is why we at SGS are convinced of the importance and application of best practice. Best practice in phosphine fumigation requires an array of competences and focal points: sealing, conditions of the goods, homogenous diffusion of the fumigant, concentration and exposure time.

Some essential elements for successful fumigation are sealing and exposure time. It is obvious that a good fumigation starts with good sealing. If the fumigant gas can not be maintained in the object or treated commodity, the result will be poor. In addition, exposure time and concentration go hand in hand, time being the decisive factor. As opposed to other gases, when dealing with phosphine, a further increase of concentration above the optimum will not result in a better fumigation, while an increased exposure time will always lead to a more reliable result. We must however often conclude that, time is money and that exposure times are often insufficiently respected, even more in trade related business. An initial assessment of the insects involved is essential to mitigate the risks of insect survival.

This general approach must be substantially reviewed when dealing with tolerant strains, which may need higher concentrations and will undoubtedly and with no exception require longer exposure times.

SGS has extensive expertise in fumigation. Today our network in key export and import areas is protecting your interests and will closely monitor that best practices are implemented. Ignoring the essentials is compromising the limited solutions we have for insect control, better to call in the professionals.
With 58 million tonnes of cereals produced annually, France has always been one of the major exporters of agricultural commodities. Phytosanitary treatments such as fumigation are part of its overall quality policy. OAIC, GASC, African millers are important and well known destinations / receivers for Sanitec team in France. In transit fumigation of cargoes on board vessels from Dunkirk to Fos / Mer is the daily work of SGS fumigators operating from seven operational centres in the territory.

Fumigation by recirculation system (J SYSTEM) has expanded over the past three years within European destinations (Portugal, Spain, UK) and also from Mediterranean ports to the Maghreb Countries. This is due to the need of increasing steps towards risk and possible damage to cargoes due to infestation.

Containers used for the export of grain and bagged wheat flour from France are also routinely fumigated.

The expertise of our Sanitec fumigators is applied at logistic hubs throughout the country in order to perform a professional treatment of goods. We have even operated at Le Havre container terminal for French Customs when a container of petroleum material, coming from Venezuela arrived fully infested with spiders. An unusual but comfortable mission for our teams to deal with.

The French trade is also importing oilseeds and animal feed from Black Sea and South American ports to Sete, Bordeaux and Montoir Ports. Panamax vessels fumigated by our SGS colleagues are ventilated and gas free measured by Sanitec on arrival, allowing safe discharging operations and compliance with regulations.

CONTACT
Stéphane Joly
Manager
+33 (0)24 090 30 96
stephane.joly@sgs.com
Commencing fumigation operations in 2000, SGS fumigates everything from containers and silos to bulk carriers, all the time meeting and exceeding the highest standards of safety and efficiency.

SGS Canada is recognized for its ability to prevent insect related risks and damage through the use of the best available techniques and procedures. SGS fumigators are highly qualified individuals, and two certified fumigators are guaranteed to be on-site for each fumigation performed. For bulk carrier fumigation, SGS monitors in line with Canada’s regulation gas levels for a 24hr period to ensure the crew’s safety and the effectiveness of the fumigation. For safety purposes we also provide complete sets of self contained breathing apparatus of the vessel’s crew.

SGS offers bulk carrier fumigations techniques such as: Surface Spreading Method, Short Probe, Deep Probe, Trenching Method and Recirculation. The fumigant, Aluminum Phosphide, is applied to in-transit commodities using the above techniques. An electrochemical gas monitoring device is used by SGS to provide instantaneous results, a more efficient tool as compared to traditional methods that take 5-10 minutes per gas reading.

If you require “on-the-go” or “in transit” fumigations, our services can include having our licensed fumigator set sail with the vessel to destination in order to minimize delay, and to ensure that all aspects of the fumigation from application to aeration are done in a safe and appropriate manner. Should insects be found in empty ship holds upon vessel arrival, SGS can fumigate using methylbromide. SGS Canada also offers a fumigation GUARANTEE.

At SGS, safety is a culture rather than a priority. Our fumigators are highly trained and possess qualifications such as: Confined space awareness and rescue, hazmat operators and technicians, SCBA (Self-Contained Breathing Apparatus) training, Transportation of Dangerous Goods and First Aid. SGS Canada also has an Emergency Response Assistance Plan that is registered with the Federal Government.

Our reputation and credibility not only come from our years of experience and consistent customer satisfaction, but also due to our highly trained employees and our ability to stay current with the latest technology. We offer our customers a “one-stop-shop” experience with our extensive list of service offerings, satisfying their many needs.

CONTACT
Mike Metzak
Operations Manager
t: + 1604 629 18 90 ext. 226
e: mike.metzak@sgs.com
The priority of fumigation service in SGS Myanmar is for cargo arrival at destination without any live infestation. Safety of fumigators and environment are essential requirements for the fumigation services.

To fulfill these requirements, SGS Myanmar’s fumigators were trained by our own international experts and the Myanmar Agricultural Service, a department of Ministry of Agricultural regulating pest control and fumigation services.

SGS Myanmar’s fumigation service started with pre-shipment fumigation of beans and pulses at supplier’s warehouses in 1992 in Myanmar. Nowadays our scope includes onboard fumigation of all agricultural products, cargo fumigation in containers and extensive pest management services in line with market demand.

SGS Myanmar has developed fumigation services to facilitate clients a smooth export and best practice services, satisfying the client’s requests and needs with reasonable prices. Both Aluminum Phosphine and Methylbromide are used for fumigation.

Onboard, warehouse and container fumigation are being provided for all agricultural products in Myanmar. In addition, SGS Myanmar is the only independent third party providing gas free testing services.

We provide the following services related to Pest Management Services:

- Fogging
- Residual Spraying
- Rodent Baiting
- Anti-Termite treatment

To protect wood against insect and termite damage, we also provide biocide injection before and after construction. To facilitate the export, we support our client to obtain Phytosanitary certification from the Ministry of Agriculture. All our interventions related to container fumigation are compliant with ISPM 15 regulations and are carried out together with the Phytosanitary Department, Ministry of Agriculture in Myanmar.

SGS Myanmar’s Fumigation department is not only providing services, but also advises clients on using the correct dosage, applying the best practice for a specific destination and providing expert information. In order to leverage the benefit of our clients, SGS is providing package services like Quality and Quantity Inspection, Fumigation and organizing Phytosanitary Certificates.

CONTACT
Aung Kyaw Htoo
Business Manager
t: +95 (1)22 02 25
e: aung-kyaw.htoo@sgs.com
International regulations and quality requirements necessitate the fumigation of goods and commodities, prior to transport or during a ships voyage. In many cases only limited attention is paid to thorough ventilation and the verification of gas concentration levels upon arrival. Often cargoes are not sufficient or not carefully ventilated before they reach their destinations. Consequently, increased risks for unsafe discharge or subsequent storage arise from the presence of chemical agents at concentrations above the threshold limit value (TLV) or maximum accepted concentration (MAC).

Today, gas free measurement not only relates to products used for plant quarantine measures or disinfection, but equally to gases and vapors that dissipate from goods themselves, such as solvents from leather and shoes or formaldehyde from furniture.

Verification of concentrations of noxious substances or oxygen concentrations is a crucial requirement for all transported cargoes or goods stored in confined spaces. If concentrations measured are not in line with international regulations, careful ventilation is required prior into further discharge. If people involved in handling the goods are unaware of the safety issues and basic procedures are not followed, they could be exposed to dangerous substances and suffer harm.

For obvious reasons, port authorities will additionally refuse discharge of the cargo and goods in case the concentration of fumigants and vapours is too high. This can result in costly delays and issues in the logistic chain.

SGS assesses and monitors risks related to a wide range of gasses and vapours in Hamburg – Le Havre range or at inland locations upon your request. Based on a risk assessment common fumigants are measured as also are formaldehyde, aromatic hydrocarbons and many other volatile compounds. In good communication with stakeholders and authorities, and provided all safety requirements are met, SGS takes care that discharge or handling can take place with shortest possible delay. Our licensed fumigator will monitor all potentially hazardous areas and ensure the safety of the workers involved.

If remnants of fumigant formulations such as sleeves, blankets or plates with metal phosphide need to be removed, due care is taken in handling and disposing of residues according to environmental regulations.

Cargoes and containers with The Netherlands as final destination need special attention. Unlike many other destinations, regulatory requirements in The Netherlands call for the measurement of gasses up to one meter depth in the cargo. This approach originates from the use of fumigants probed in the cargo in dry and cold conditions which leads to catastrophic safety hazards due to insufficiently reacted product at arrival.

For these supply chains a better practice is to use retrievable formulations, to discard them prior to arrival and to start ventilation as soon as possible. SGS can perform these interventions at many points of interception, e.g. in a stop-over port or during bunkering.

It is in the interest of all parties involved that care is taken to protect all involved in handling goods. With many years of experience and an elaborated network, SGS has an expert team of licensed fumigators with state of the art equipment at your service. Accurate measurements followed by issuance of a gas-free certificate will allow safe and swift operations. If required, solutions for handling dangerous waste are just part of the service.

**CONTACT**

Johan Pype  
Business Manager  
t: +32 (0)3 570 97 50  
e: johan.pype@sgs.com