

THE COFFEE HAZARDS & RISKS GUIDE

—
Everything about green
& roasted coffee hazards.

Trabocca

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THE DARK SIDE OF SPECIALTY COFFEE

Congratulations! Your journey in coffee has brought you to one of the toughest and most uncharted topics in the industry: food safety. Let us get it out of the air before we dive in. There is nothing sexy about food safety regulations, period. But then again, there is also nothing sexy about health risks. To minimize the latter, you need a firm grasp on the former: the darker side of specialty coffee.

This Coffee Hazards and Risks Guide brings you up to speed and explains every nook and crack of the possible hazards and risks in green (and roasted) specialty coffee. You will discover what we do as a green coffee importer to minimize risks and how we comply with food safety regulations. And as you travel through the entire supply chain you will learn about every hazard in its context, all the way to your own roasting plant. Here, the guide explains which risks you, as a coffee roaster, are responsible for to minimize as much as possible.

Ready to open Pandora's box on food safety?

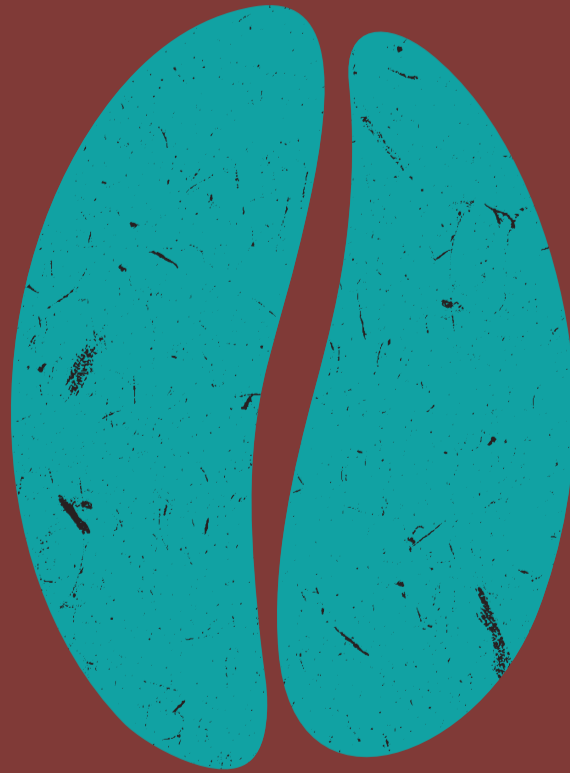
WHY DO COFFEE IMPORTERS NEED TO DEAL WITH SAFETY REGULATIONS?

Specialty Coffee is a very clean product. However, this does not mean that there are no safety risks for specialty coffee. Even though the higher cup quality reduces the risks and categorizes specialty coffee as a lower-risk product, there is still a chance the product is harmed during its journey through the supply chain. Specialty coffee, like its commercial counterpart, needs to comply with basic food safety regulations and cover specific risks that may arise throughout coffees' many global movements.

At Trabocca, it is our job to minimize food safety risks and ensure all products, high and low grades, comply with food safety regulations and certification standards. But what do we do to ensure this? As a coffee importer and trading company, we do not produce a product. Rather, our job is to source coffee and deliver it to roasters across the world. Because of our holistic and central position in the supply chain, we are connected from field to cup and carry the responsibility to enforce thorough food safety protocols and checks throughout the chain.

Our Quality team takes the lead in ensuring the food safety of our products. The Trabocca Quality team, spread out over offices in Addis Ababa, Amsterdam, and Minneapolis, needs to determine all the possible hazards and their risk levels throughout the supply chain. This field of operation spans from the farm to your roasting plant. Besides determining the hazards, our Quality team is dedicated to mitigating the risks as much as possible. This means we need to know the product of every supply chain so we can make an informed decision on a food safety level.

A note before diving into the guide: as you learn about the many hazards and risks, know and understand our Quality team has a firm grip on protocols to guarantee a safe cup of coffee.



DIFFERENT TYPES OF FOOD SAFETY AND QUALITY CONTROLS

Food safety is a catch-all term. You can consider it as an umbrella harboring four categories of risk assessment; general safety for human consumption, food fraud, food defense, and product quality. This chapter takes you through the definitions of each term, starting with food safety itself.

FOOD SAFETY

When you bypass food safety as an umbrella term, you can sum up its meaning like so: food safety covers all risks of consumption. Or more specifically: food safety considers any hazard and risk related to the safety of consumption. Is there anything that can happen to the product, unintentionally, that can make people sick after consuming? E.g. Is there mold growth in the product? Is the packaging food safe? Or is there contamination with pesticides or allergens?

FOOD FRAUD

Food fraud covers all risks of fraud. The main question that needs to be answered is, how can the seller benefit from the coffee economically in a fraudulent manner? E.g. is the old crop blended into the current crop? Or is uncertified coffee sold as certified with a premium?

FOOD DEFENSE

Food defense covers all risks related to intentional tampering that will harm the consumer. E.g. intentionally adding glass to the finished product. However extreme this sounds, it needs to be considered within the food defense analysis.

PRODUCT QUALITY

Product Quality relates to the quality of the product. From cupping to green grading, and to screen sizing. Product Quality control touches the core of what we do as a coffee importer: checking and double-checking if the coffee matches your requirements – and of course, the taste!

HAZARDS VS RISKS

A
HAZARD
IS THE POTENTIAL OF HARM,
&
RISK
IS THE LIKELIHOOD OF A
HAZARD OCCURRING &
CAUSING HARM

E.g. lightning is a hazard and might cause you harm if it strikes you. However, when you are indoors, the risk of lightning striking you is negligible. But if you are outside in an open field holding a big umbrella during a storm, the risk is much higher.

If the hazard is extremely dangerous and the risk is high, full control is necessary. If there is no hazard, or the hazard has very minor consequences, and the risk is extremely low, perhaps control is not necessary.

The Quality team is always trying to answer these questions:

1. What is the potential harm of the hazard?
2. And how likely is the hazard to occur; what is the level of risk?

Based on those two questions, protocols and controls are put into place.

THE MAIN HAZARDS OF GREEN COFFEE



Ok, now for pandora's box. What are the main hazards of green (and roasted) coffee? For starters, you can find four main hazard categories within the coffee industry. Namely: chemicals, biological, physical, and allergens. This chapter will unfold all four hazard categories and subcategories, starting with chemicals.

CHEMICAL HAZARDS

The three prime chemical hazards in green coffee can be broken down into three sub-categories: pesticides, mineral oils, and packaging.

PESTICIDES:

When mentioning pesticides on a food safety level, we are talking about chemical pesticides to control pests or weeds at coffee farms. Pesticides can seriously harm you or your customers when consumed. There are specifically set MRLs (Maximum Residue Levels) for green coffee defining how much residue of a pesticide may be present in green coffee. MRL's vary per country and region.

Organic green coffee should be free of residues or pesticides. But in some circumstances, traces of pesticides may be allowed. Whatever the local regulations are, you cannot rely on roasting (the infamous kill step), brewing, and filtering to remove these pesticide residues within coffee. So, supply chain actors, primarily coffee importers, need to implement thorough control systems. With main question being: how do pesticide residues make their way to a green batch of coffee?

To answer this, we must hone in on the farm and supplier level. Often, it is a case of overuse or misuse of pesticides on the farm. Or in other cases, a neighboring farm might spray pesticides and the wind carries it to other farms and processing stations. Another example is when a processing machine is used, and not cleaned, for both certified and uncertified coffees.

Trabocca asks our suppliers if pesticides are used, and if so, what types are used and how. Besides farm and processor pesticide contamination, green coffee is also vulnerable during transport or at warehouses.

What is the risk level?

At Trabocca we have seen that pesticide is a low risk for food safety. Any residues that we find are below levels that are unsafe to consume. But food safety is not the only risk assessment we make for pesticides. The risk of an organic coffee containing pesticide residues is higher. And so, we randomly test batches at accredited third-party labs on residues, based on our organic risk assessment, which takes product, origin, and supplier into consideration to guarantee our organic coffees are pesticide free.

MINERAL OILS:

Mineral oil is a chemical substance made from crude petroleum oil. Think of diesel or gas for your car, or oil for an oil lamp. There are no limits defined for green coffee currently, however, some countries have set up guidelines, as MOAH (mineral oil aromatic hydrocarbons), which is a group name for certain types of mineral oils, might be carcinogenic.

Mineral oils find their way into green coffee through the overuse of grease in machinery during processing. Another example is farmers who use traffic roads as drying patios because theirs is a lack of even ground within their compounds. Or suppliers of coffee drive their trucks across patios filled with coffee. But the mineral oil hazard remains high risk further down the line. Leaks of automobiles can still occur during transport or when the coffee is stored in jute and bulk.

PACKAGING:

Speaking of transport and storage, the packaging is another hazard where mineral oils can find their way into green coffee. Jute bags, and other types of packaging, might be made of

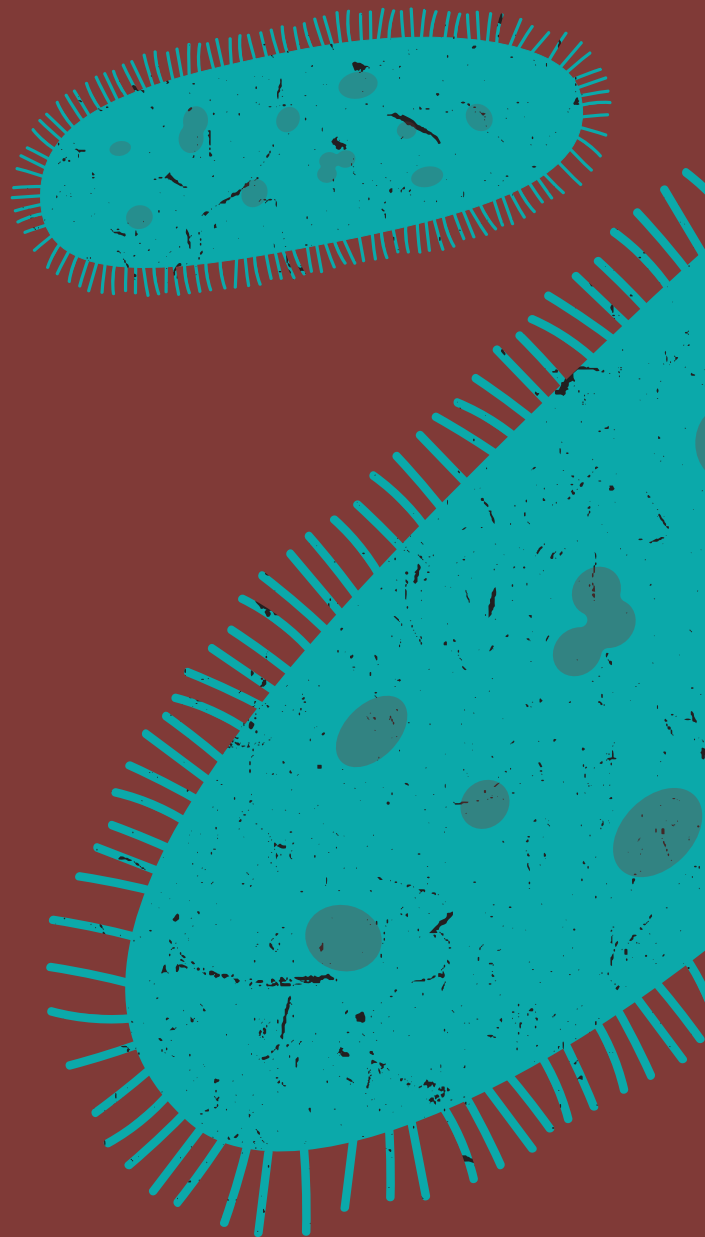
fibers softened by mineral oils. Or the ink used for branding and bag marks could be mineral oil-based. Because packaging is not exempt from the mineral oil hazard, suppliers must use food-grade quality packaging. Not all chemical hazards can be traced back to suppliers. Sometimes contamination occurs during transport or warehousing, or further processing, such as decaffeination.

At Trabocca we ask our suppliers how and on what surface coffee is dried, and what type of grease is used for machines. We also request a food-grade certificate of the export packaging. To limit the risk of cross-contamination, we also check the protocols or provide specific instructions to third-party companies we contract for any other handling necessary, such as decaffeination or repackaging.

BIOLOGICAL HAZARDS

The main biological hazards for green coffee are mycotoxins. Mycotoxins are toxic and are compounds formed by fungi. In other words, they are the result of mold. The most frequently found mycotoxin in coffee is Ochratoxin A (OTA). Roasting can (partially) kill a lot of mycotoxins, however not all of them. Most countries have set limits on allowed levels of OTA in roasted coffee. Only a few countries have a set limit on green coffee. The cause of OTA can be found throughout the supply chain. From picking overripe cherries to bad fermentation practices, to under-ventilated warehousing or leaky containers. It is safe to say OTA is a high-risk hazard.

At Trabocca, we ask our suppliers about their harvesting and processing protocols. And we ask our suppliers to check containers before loading. We also request our warehouses to check the containers on arrival for leaks and mold. If coffee has a moisture content above 12.5%, or, more significantly, has a water activity above 0.69, the chances of OTA and other toxins developing is high. We always measure both parameters on all pre-shipment and arrival samples we receive. If we have any concerns, the batch is tested on OTA by an accredited external lab. On occasion we also test a random batch.



PHYSICAL RISKS

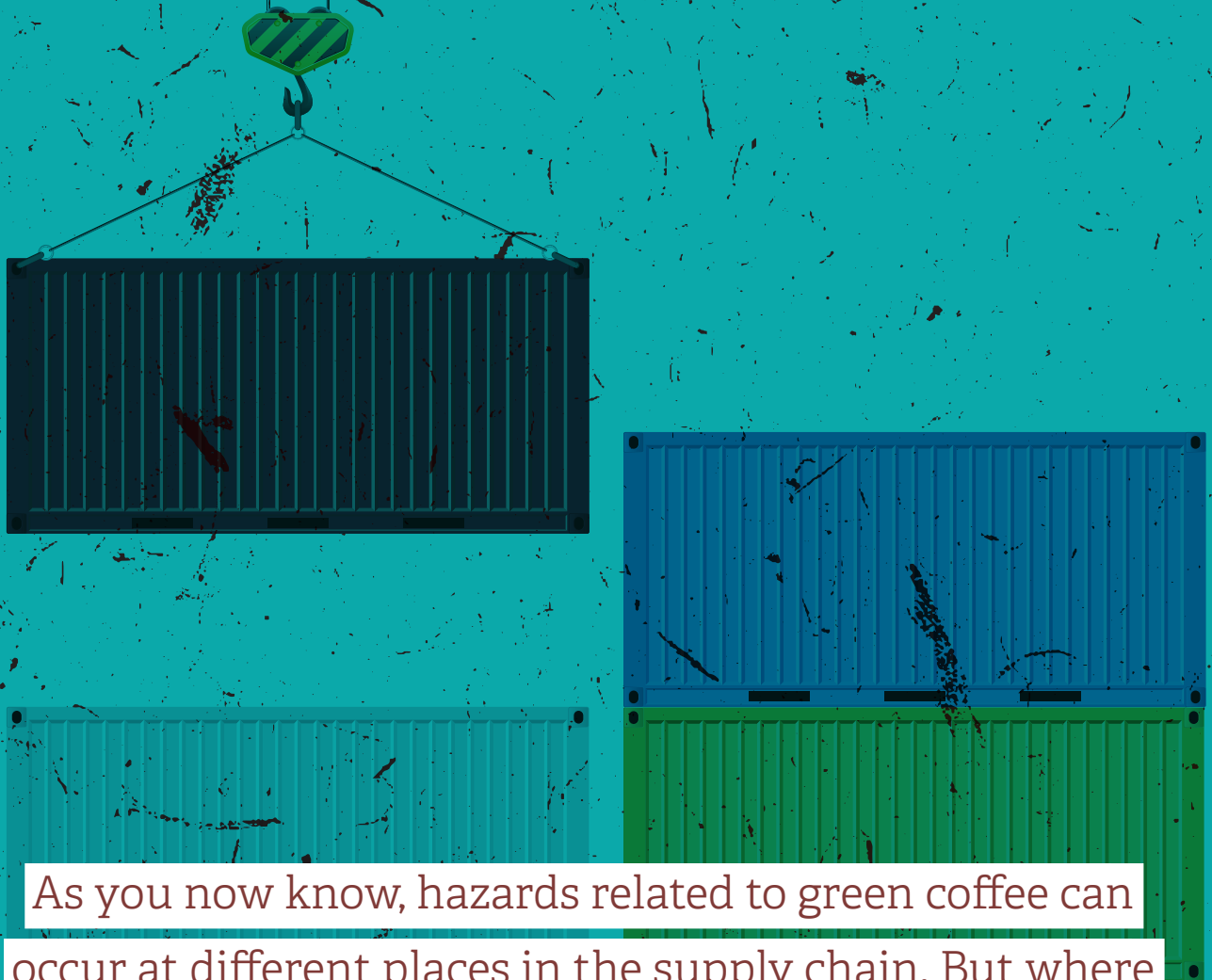
Physical risks, and more specifically foreign materials, are the fourth hazard for green coffee. The risk for the consumer, however, is very low because coffee is usually roasted, ground, brewed, and filtered. The chances of a piece of foreign material ending up in your cup of coffee are negligible. However, as you can imagine, it might wreak havoc on your machines.

We ask our suppliers what controls they have in place to avoid foreign material from ending up in the green coffee we buy. Many suppliers use hand-picking to reduce the risk, and often have multiple sorting steps in place. From destoners to infrared, and color sorting. To validate these sorting systems, we green grade a large portion of the samples that come across our desks.

ALLERGENS:

And finally, there is always a risk of allergens contamination. However, as coffee beans need to be roasted, ground, brewed, and filtered, the risk of a consumer having an allergic reaction is near to zero. Nonetheless, we always ask all our suppliers and companies that handle our coffee about the additional products they handle and if there is a possibility for allergen cross-contamination.

FOOD SAFETY THROUGHOUT THE SUPPLY CHAIN



As you now know, hazards related to green coffee can occur at different places in the supply chain. But where specifically? In this chapter, you see the hazards in their context and what we do to minimize the risks.

CONTROLLING THE SUPPLY CHAIN

As a coffee importer, we want to know what hazards occur where, and how we can minimize the risks. We do not produce a product and cannot control the processing or handling, but we can assess the hazards and their risk levels. During these assessments, we check what suppliers and service providers do to limit hazards and risks.

Our controls are focused on several elements:

- An approval system that our suppliers and service providers need to go through,
- organoleptic and laboratory testing of the product,
- educating our quality team through up to date literature, standards, and legislation,
- and assessing, and analyzing, issues that occurred in the past.

We look at the processes of the farmer, the primary processor, the secondary processor, our transport service providers, and our warehouses. And if we decaffeinate a coffee, we hone in on specific hazards, risk levels, and controls there too.





1. SOURCING COFFEE:

The first step is sourcing coffee. A sample arrives in our cupping lab and goes through the first assessment steps. The coffee is measured on moisture content and water activity to determine the risk of mold and pathogen growth that can lead to OTA. Besides this food safety assessment, the coffee is cupped to assess the quality of the product.

2. PURCHASE:

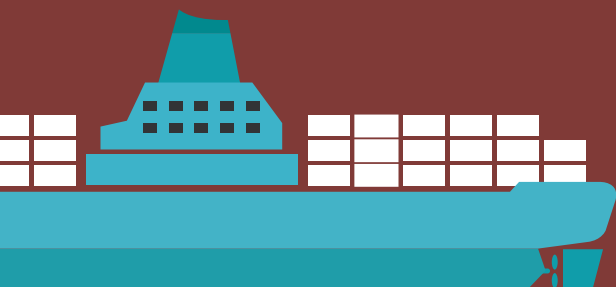
After this first assessment, we decide if we want to buy the coffee. If we do, the supplier needs to go through a vendor approval system. This consists of a questionnaire, and a request for all types of documents that the supplier needs to fill in. The input we receive gives us information on any possible hazards and controls that the supplier implements to cover these hazards. For example, 1) we want to know if pesticides are used. 2) If the supplier has a system in place to control fermentation, 3) what sorting steps are used and how often they are checked,

4) and what kind of export packaging is used. If the coffee is certified, we want to know if the certification has ever lapsed and if the supplier sells both certified and non-certified coffee, which may increase the risk of pesticides in the organic batches.

We can only make a contract if all the information has been received. But the checks and controls do not end here. Based on the input of information, the quality team determines how often we need to verify and validate the safety of the products. Through verification, we can check if the controls of the supplier are working. After analyzing, we might decide to do a re-occurring pesticide residue test, check the level of mineral oil in the batch, or perform a test to see if the coffee has OTA. These tests can be done on a pre-shipment sample or a sample taken from the warehouse on arrival.

3. SHIPMENT & STORAGE:

Before we ship the purchased and contracted coffee, we receive a pre-shipment sample. This sample is checked on moisture content and water activity, as well as cupped. If necessary it is green graded.



Final approval for shipment is given when all parameters are in line with the contract, food safety protocols are within bounds, and the bag markings have been approved.

Of course, not all hazards occur at the supplier level. Sometimes hazards pop up later in the supply chain. Mold may start growing on the coffee because there is a leak in the warehouse. To control this, we ask warehouses, repackaging agents, and decaffeination companies we contract to go through a subcontractor approval. Like the vendor approval, this consists of a questionnaire, packaging information in case of repackaging, and work instructions.

4. THE COFFEE ROASTER:

All the hazards, risks, and protocols we mentioned in this guide must be covered or addressed by us. But there are several risks we do not or cannot cover: pathogens and acrylamide.

ACRYLAMIDE:

Acrylamide is a carcinogenic chemical that is formed in coffee during roasting. It starts forming at 120 degrees Celsius, or 248 degrees Fahrenheit. It peaks at the beginning of the roast, meaning longer and darker roasts have less acrylamide. Arabica usually has lower levels of acrylamide formation compared to Robusta. Regulations regarding the maximum limit of acrylamide differ per country or

region. Because acrylamide is formed during roasting, roasters may need to control the formation of acrylamide and monitor levels, depending on the legislation in their area or areas they sell roasted coffee to.

PATHOGENS:

Pathogens are biological hazards that can cause disease. You may know some pathogens by names, such as salmonella or E-coli. But there are a ton of pathogens that find their origin in bacteria, viruses, or parasites. Whatever the offspring, they all contaminate green coffee in a myriad of ways throughout the supply chain. With coffee going through so many hands during the supply chain, it is almost impossible to fully control pathogens. But the good news is that coffee roasting provides a 'kill step'. So while the roaster develops beautiful flavors, it simultaneously eliminates pathogens. Of course, roasters and baristas still need to make sure not to reintroduce pathogens after roasting.

FOOD SAFETY IS A CONTINUOUS PROCESS

Quality work never ends. National and regional legislations change. Certification standards are updated, and new scientific discoveries are made. Suppliers change protocols. New packaging products land on the market. And new problems might arise, we did not account for. That is why our quality work is continuous. New controls may need to be made and parameters might need to be adjusted, to ensure your cup of coffee is as safe as it is delicious.

Well done! You have covered a ton of food safety information. You now know what hazards are in play within the coffee industry and what we do as a coffee importer to minimize the risks. By following the supply chain from sourcing to your roastery, you know which hazards can potentially threaten the food safety of your roasted coffee. If you need more information, either on roaster-related food safety protocols, or food safety on the green coffee spectrum, please navigate to these helpful and interesting links.

CREATE YOUR OWN HACCP SYSTEM:

Want to know more about food safety, how to set preventive controls and get some templates for your own food safety system including a HACCP table? We recommend the [FSPCA preventive controls for human food manual](#). This manual also refers to all USA guidelines regarding food safety.

RASFF:

The RASFF is the EU food safety alert system. Through the RASFF, you can look up any food safety issues that have come up in the past in the EU per product category. We use this to see if there are any new hazards, or increased risks we should consider when updating our HACCP table. For the USA safety alerts, [click here](#). Looking for more information on an international level? You can use [HorizonScan by Fera](#) to see all alerts from across the globe. Reviewing documentation requires a subscription.

EFSA:

The EFSA is the EU food safety authority, and is a great resource of information.

ICO:

On the website of the [International Coffee Organization](#) you can find the Coffee Quality Improvement Program, which includes information on grading, and moisture levels, as well as several guidelines and resolutions regarding food safety and product quality, as well as guidelines for green coffee buying.

ITC:

The website of the [International Trade Centre](#) has a lot of information regarding quality control of coffee, explaining ICO export standards, HACCP, mold and OTA prevention as well as grading.

EU:

The EU product requirements can be found [here](#).

FDA:

See the [FSPCA handbook](#) for a good overview of requirements set by the FDA. California has additional guidelines producers need to follow, under prop 65. You can find these [here](#).

MRLs:

You can look up the [MRLs](#) (Maximum Residue Levels) for Europe. For the USA these are a bit more difficult to look up, as some are controlled by the [EPA](#), and some by the [FDA](#). You can register with [BC Global](#), and look up MRLS there for the USA and other countries around the world. Also check out the website of New Zealand's Ministry for Primary Industries, that lists MRL requirements for multiple countries across the world.

Organic standards:

Organic standards differ per country. EU organic may have different standards and regulations compared to the USA organic or Japanese organic standard. At [IFAOM](#) organics international you can find information on equivalency between different organic standards.

Social standards:

There are many different social certifications. Check the website of the specific certification of the coffee you have bought for more information. A short summary of the certifications Trabocca carries can be found [here](#).

Trabocca

In pursuit of great
specialty coffee

Need advise on food safety matters
related to green and roasted coffee?
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