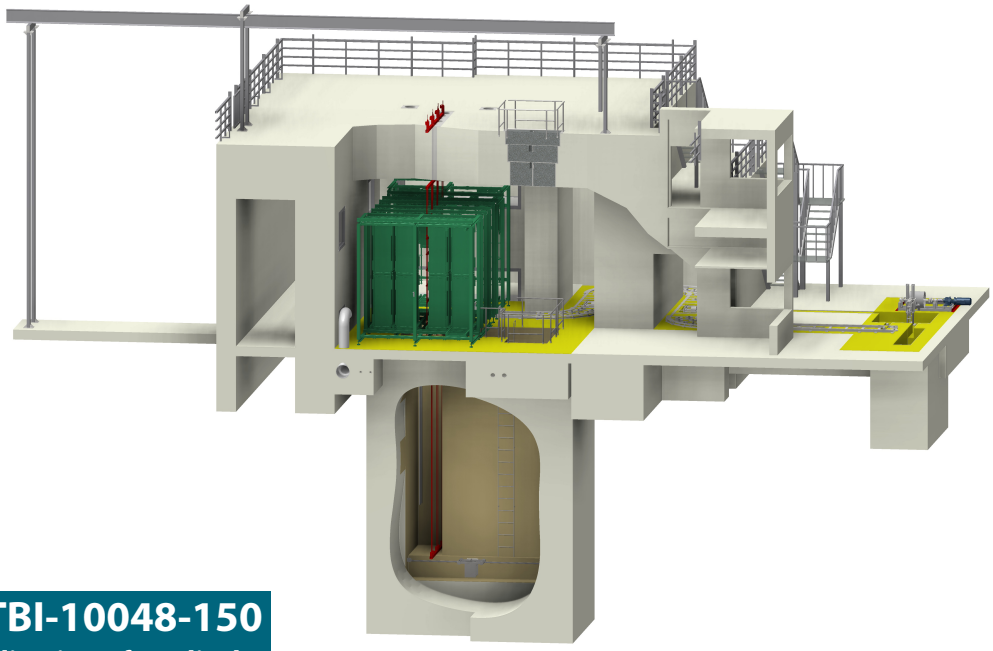
Industrial Gamma Irradiation Facilities



GSR TBI-10048-150

for sterilization of medical supplies, phytosanitation and increased food safety

GSR has installed its proven irradiator design at locations worldwide since 2005. It is based on a tote box system which can be loaded with products in customer-specified bags, cartons or other containers. A concrete maze separates the product handling area from the irradiation room. The tote boxes are filled manually in the handling area and transported through the maze on a rail car.

Use cases

- Chemical-free sterilization of medical supplies
- Disinfestation of rice, grains and pulses to prevent storage losses due to pests
- Phytosanitation in dried foods (herbs, tea, spices) or fresh foods (fruit, vegetables) for export purposes
- Sprouting inhibition and retention of nutrition in e.g. potatoes, onions, garlic
- Delayed ripening in fresh foods
- Reduction of pathogens in fish, poultry, meat to prevent spoilage and protect health
- Emergency meals for crisis situations
- Integration in the cold chain, e.g. frozen seafood

Technical data

Volume of the tote boxes:	720 liters
Maximum load per tote box:	320 kg
Maximum throughput:	23 m^3/h
	180,000 m^3/a

The use of gamma irradiation is the state of the art technology for complete and chemical-free sterilization of single-use medical supplies such as gloves and surgical blades as well as medical / dental implants, etc.

A gamma irradiation facility can also be an important part of an overarching strategy to improve food security by reducing post-harvest losses and destruction by pests during storage. Additionally, nutritional value of food can be preserved by preventing sprouting, over-ripening and spoilage. Specialty applications include ready-to-eat meals for supply during humanitarian crisis situations.

The facility design focuses on mechanical simplicity for low maintenance and places minimal requirements on technical infrastructure. It is characterized by low consumption of electricity, high up-time, ease of service by an in-house maintenance unit. All of these features separate GSR's facility design from other technologies such as x-ray or e-beam which require maintenance and supply of spare parts solely by the manufacturer.

Manufacturer:
Gamma-Service Recycling GmbH
Bautzner Straße 67A
04347 Leipzig
Germany

Phone: +49 341 46372-500
Fax: +49 341 46372-522
E-mail: gsr-contact@ezag.com
www.gamma-recycling.de

Eckert & Ziegler
Gamma Service Recycling

Industrial Gamma Irradiation Facilities

Dose guidelines for irradiation of selected foodstuffs

Product Type	Dose Range typical	max	Purpose
garlic, onions, ginger, rice, potatoes	50 – 300 Gy	100 Gy	• inhibit sprouting • delay ripening • disinfestation or inactivation of pests (e.g. insects) • increase storage life
fresh fruit, vegetables	0.3 – 1.5 kGy	3 kGy	• reduce pathogens (salmonella, listeria, shigella, e.coli) • delay ripening, increase shelf life • phytosanitation for export purposes
wheat, pulses, rice, maize bread	1 – 2.5 kGy	6 kGy	• reduce pathogens and organisms causing spoilage • prevent aflatoxin production • disinfestation
meat, poultry, fish, seafood (fresh, frozen)	1 – 5 kGy	7 kGy	• reduce pathogens (e. coli, salmonella, listeria, staphylococcus) • increase shelf life
tea, spices, nuts	20 – 25 kGy	30 kGy	• reduce pathogens (bacteria, mold) and organisms causing spoilage • prevent aflatoxin production • phytosanitation for export

Comparison of gamma ray and e-beam technologies

	Gamma	E-beam	Summary
Agent	uncharged photon	charged particle	charged electrons interact with the matrix → lower penetration depth
Generation principle	intrinsic radioactive decay	generation of a particle beam in an accelerator	beam generation is a highly complex process, radioactive decay is a stable and completely predictable natural mechanism
Dose uniformity ration (DUR)	+++	+	gamma has better DUR: product dose range min to max is narrower and treatment time is optimal
ideal product density	up to 0.5 t/m^3	up to 0.25 t/m^3	due to higher penetration depth of gamma photons, a wider range of products can be treated
Energy consumption	low	high	e-beam: high consumption due to electron accelerator and chiller
Maintenance	low-cost parts, low expertise, basic workshop	high-cost external specialists and spare parts	GIF: core components are pneumatic cylinders which can be maintenanced by own personnel e-beam: specialty electronics from original supplier only and requires on-site service
Requirements on infrastructure	low: intrinsic decay; pneumatic drive	high: electron beam generation, cooling system	e-beam: high mains grid stability required for stable particle energy
Capex	+	+++	GIF main costs: local building construction, most funds remain in the local economy

Manufacturer:
Gamma-Service Recycling GmbH
Bautzner Straße 67A
04347 Leipzig
Germany

Phone: +49 341 46372-500
Fax: +49 341 46372-522
E-mail: gsr-contact@ezag.com
www.gamma-recycling.de

Eckert & Ziegler
Gamma Service Recycling