



**DUTCH  
INCINERATORS**

# Convert your Waste to Heat and Power!

Engineered for a cleaner tomorrow

Head office:

Dutch Incinerators BV (Netherlands)

Branch offices:

Dutch Incinerators (Thailand) Co. Ltd.

Environ DI Ltd. (United Kingdom)



## INTRODUCTION

# We Build We Convert We Innovate

Dutch Incinerators is a skilled EPC contractor, specialized in providing turnkey solutions in thermal waste processing and waste handling infrastructures.

Our solid foundation and excellent reputation is based on 30 years of technical knowhow and practical on-site experience in the hazardous waste incineration industry.

We design and build modern versatile industrial incinerator plants for virtually any waste type, combined with cost-effective energy recovery technology, to convert waste heat into sustainable and usable forms of clean renewable energy, including heat, steam and electricity.

New climate friendly technology has made our advanced incinerator systems IED compliant, which makes them safe for human health and the environment.

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## OUR TECHNOLOGY

# Highly profitable and climate friendly

Direct fired Rotary Kiln Incineration has been proven to be the Best Available Technique for large scale waste disposal requirements.

It has become our **preferred thermal treatment solution** for safe and effective destruction of heterogeneous waste feedstock and difficult to handle wastes.

**Counter-Current Rotary Kiln Incineration**, as engineered and constructed by us, is a stable and reliable processing technology at well controlled combustion conditions. The system is capable of accepting and treating the harshest waste mixtures presented and being able to accommodate large variations in waste sizes, waste composition and calorific value. Put differently, it's the **multipurpose workhorse** under all thermal treatment systems.



Counter-current rotary kiln is not the cheapest technology, but if built correctly, it's the **most versatile in waste acceptance and utmost reliable in day to day operations and maintenance.**

Compared to the cheaper conventional static (non-rotating) incinerators, a rotary kiln incinerator constantly lifts and tumbles the waste, mixing with air (oxygen) and accordingly warrants maximum combustion efficiency with minimal high quality bottom ash. The continuous rotating process circumvents the possible risk of waste solidification at the bottom. Where waste calorific value and oxygen supply are sufficient, this will lead to a thermal chain reaction and self-supporting combustion, without the need for additional fossil fuels (gas/diesel).



## APPLICATION

Our sturdy incinerators are designed and constructed for processing of hazardous, chemical, toxic, medical and infectious waste materials. In fact, they are built for thermal treatment of most difficult wastes and can be easily applied for:

REFINERY & PETROCHEMICAL  
WASTES

OIL CONTAMINATED  
WASTEWATERS AND SOILS

MERCURY

MEDICAL & PHARMACEUTICAL  
WASTES

COMBUSTIBLE TOXIC LIQUIDS

PESTICIDES

NON-RECYCLABLE CHEMICALS

PAINTS

HIGH CHLORINATED  
HYDROCARBONS & PCB'S

OIL CONTAMINATED WASTES

SOLVENTS

ETC.

However, non-hazardous wastes and non-recyclable wastes at the end of the recycling line can be perfectly processed within our incinerators as well:

**We build multipurpose incinerators for everything that is combustible. Waste not suitable for reuse or recycling is still fit for energetic recovery.**

RDF/SRF

CAR FRAG

E-WASTE

COMBUSTIBLE C&D WASTE

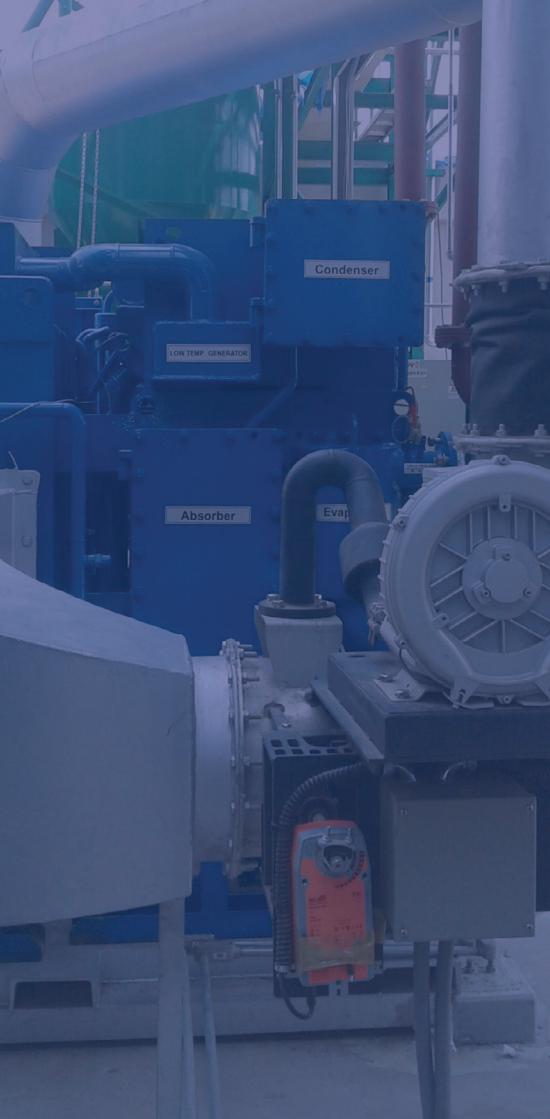
RUBBER

REJECTED CONSUMER  
PRODUCTS AT QUALITY CHECK

SCRAP TYRE

FINES

The treatment of contaminants, such like chlorine, sulphur, bromine, nitrogen, fluorine and other halogens are not a problem either. In other words, **there are no limitations.**



## Advanced design characteristics

A counter-current rotary kiln incinerator is the multipurpose workhorse of all incinerator types, with largest operating margin and widest variation of physical, chemical and thermal properties.

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## DESIGN BASIS

Our fully automated rotary kiln incinerators are designed for continuous operation 24/7, at variable rotational speed. They are equipped with a wide operating window on thermal input, ranging from 70% to 130% of the design capacity. The system can absorb considerable input fluctuations in calorific value and accommodate inconsistent throughputs in periods of low and high waste availability.

Intermittent operation is strongly discouraged, because of economic motives, higher wear and tear and for environmental reasons.

As a design rule, we adopted the **KISS principle** (Keep It Smart & Simple). Systems work best when the design is kept simple and straightforward, rather than made complicated. For the fact that every project is unique, we always design our incinerators on a case-by-case basis, taking the particular waste type, physical shape, waste composition and calorific value into account.





## THERMAL STABILITY

Rotary kiln incinerators have a high thermal stability of the combustion process, because of the long residence time of combustible wastes in process (30 – 90 minutes). The rotational speed of the kiln can be adjusted to control the residence time in burning. Continuous ash removal does not interfere with the temperature and burning process.

## PLANT AUTOMATION

Our turnkey facilities are completely automated and operated with our very own software, driven with PLC technology (programmable logic controller) and built with top quality European automation components.

Plant automation systems include continuous data acquisition and storage, reporting, trending, I/O visualization and an overview of all electrical systems.

Upon specific client request, we design and provide online remote access control from anywhere in the world. A customized plant automation system and additional visualization screens can be developed and implemented.

**Our counter-current rotary kiln incinerator has earned a remarkable reputation for its reliability, durability, efficiency and longevity.**

## FEEDING SYSTEM

Our waste feeding system is adaptable and can be designed upon the waste's physical shape, waste composition and calorific value. We have feed design options available to accommodate heterogeneous waste mixtures; e.g. organic, inorganic, solids, dust, gases, liquids, semi-liquids, emulsions, pastes, slurries, sludges, wastewater, big and small, wet and dry, lumpy and uniform, high and low calorific value waste streams. Size of the waste is only limited by the dimension of the rotating kiln guillotine door and ash discharge system.

There is no need for prior waste sorting, shredding or mixing, as long as the waste calorific value is adequate for burning. Our system can accept, without any problem, plastic and metal drums, IBCs, wooden and plastic pallets, FIBCs.



## OPERATIONAL RELIABILITY

Our advanced incinerator technology guarantees a minimum plant uptime of 90%, but current practices show a proven record that the typical plant uptime is 95%-98% (347-358 days/year), with only 1 prescheduled complete shutdown for general annual maintenance.

High operating temperatures (850°C – 1100°C) in primary and post combustion chambers ensure complete destruction of hazardous components, with overall destruction efficiency over 99.9999%.

When well maintained, incinerator lifetimes range from 20–25 years.



## NON-CLOGGING DESIGN

The gradual build-up of dust and slags, known as **slag agglomeration or clogging**, is a common highly underestimated problem in waste incineration. Clogging occurs due to inadequate design and results into multiple unscheduled shutdowns. It has significant impact on the reliability and uptime of the incinerator system, with major economic impact.

We have successfully resolved slag agglomeration with specific non-clogging design measures. That's the justification of our optimal operational reliability and typical uptime.

## ENERGY CONSUMPTION IS NEGLIGIBLE

Diesel, LPG or natural gas is only required throughout process start-up (+/- 5 hours), for heating the kiln and initial ignition of the waste. After boot phase, a thermal chain reaction and self-supporting combustion of the waste arises. Subsequently, no additional fuel is necessitated to maintain the temperature and combustion process.

Our incinerators have a low electric power requirement, as combustion air supply takes place at low pressure.



## LOW NEED FOR OPERATING MANPOWER

Our thermal treatment plants are fully automated with remote monitoring, including automatic waste supply and continuous ash removal (no shutdown required).

Our systems require less skilled operators for operational control, with minimum supervisory support. Actual manpower depends on the size of the system, but as for safety precaution, we recommend minimum 2 operators per shift.



## LOW MAINTENANCE REQUIREMENT

Our incinerators require **only 1 prescheduled complete shutdown per year**, of maximum 10-15 consecutive days, for general annual maintenance service and wear and tear repairs.

Daily or weekly routine inspection and systematic upkeep, performed by the incinerator operator, ensures smooth operation and maximizes the lifetime of the mechanical system. All our designs demand for low wear and tear repairs and minor replacement parts.

There are no unscheduled shutdowns reported when the incinerator is properly constructed, well operated and judiciously maintained.

## CONSUMABLES & UTILITY COSTS REMAIN LOW

Supplies are restricted to fossil fuel, electricity, process water and emission controlling additives. The total consumption of each is directly related to the incinerator design, waste type, contaminant concentration and hourly throughput.





## COMBUSTION RESIDUES

After the total combustion process, there will remain **kiln bottom ash** (combusted residue) and **fly ash** (dust) collected from the flue gases. Metals and glass can be separated from the bottom ash after processing and properly discharged for recycling.

- 1 For non-hazardous waste materials, it has been shown that the kiln bottom ash residue is a non-hazardous remainder that can be safely applied as covering layer on a landfill, as a secondary construction material or as substitute for gravel.
- 2 For all kind of hazardous waste, the kiln bottom ash should be analysed (in laboratory) to know if there are still eco-toxic metals or other environmentally harmful substances present in the ash residue. When defined as non-hazardous kiln bottom ash, the residue can be disposed safely.
- 3 Fly ash is filtered from the flue gases and could still consist of environmentally harmful substances (heavy metals). It must be safely disposed at a controlled (secured) hazardous landfill site or sent to a specialist treatment plant. It should be done properly to avoid concerns for local residents and the environment.

The total amount of ash mainly depends on the composition of the waste material.



## EMISSION CONTROL

We install dry and wet industrial scrubbers, two of the most efficient pollution removal technologies for incinerator flue gas cleansing, both in compliance with the EU Directive and US EPA standard.

A dry scrubber is the most efficient to meet the strictest environmental standards. Dry scrubbing is more expensive in construction materials than a wet scrubber, but the dry scrubber is cheaper in daily operations (reagent additives). Additionally, dry scrubbers do not show any visible plume on the chimney, compared to wet scrubbers that show a white vapour plume on the stack.

All our scrubbers are installed with CEMS technology, for continued monitoring on emissions released into the atmosphere. Our emission control is fully IED compliant.

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## ENERGY RECOVERY

The rotary kiln incinerator process produces hot flue gases, which can be made suitable for waste heat recovery. The recovered waste heat can be converted into a green energy, creating several viable options (hot ambient air, thermal oil, steam and electricity) with multiple applications.

The recovered energy can be used for: production of hot water or chilled water, storage room cooling, district heating, process heating, drying processes, steam production, power generation, etc.

Power generation could offset the incineration plant's parasitic electrical loads, offset site load of other electrical appliances or export excess power back to the electric grid.

Energy recovery is optional, but can be fully integrated in our basic incinerator design. The type and application are upon customer requirement and project feasibility.

## OCCUPATIONAL HEALTH & SAFETY

Health and safety are the top priority of our design and construction. A full automated shutdown will be induced immediately, in case of excessive operating conditions, fire or loss of electric power.

Hence, preventive hygienic measures and safety precautions to the personnel and environment always have our prime attention.





## NOISE & ODOUR NUISANCE CONTROL

The environmental noise emission level is within the international standard. Unpleasant odours are extremely well controlled and prevented from escaping into the atmosphere.

## AMPLE OPERATOR TRAINING

A general operating manual is part of the handover package. It's the first guideline for good operating practice, safety tuition, daily overall inspection and routine maintenance services for regular and general upkeep. Our training courses are designed to make the day-to-day running of the incineration infrastructure as efficient and smooth as possible.

Our profound operator training results in more uptime and minor wear and tear.

## AFTERMARKET SERVICE

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Our standard warrantee is 1 year, with spare parts for the first operational year and part of the contractual hand-over package.

A client can opt for a renewable 5-year **Service Maintenance Contract**. The annual plant overhaul is for our responsibility and executed by our technicians. All genuine spare parts are included and supplied by us under the Service Maintenance Contract.

Online (remote access) technical support and quick assistance are available whenever required.



## INDOOR - OUTDOOR DESIGN

Our facilities are engineered for outdoor application, whereby all mechanical equipment, appliances and supports are designed and installed to resist the harshest nature and weather conditions. For operator comfort, the plant could be designed inside a building as well.

## TAILOR-MADE SOLUTIONS


Each customer is unique. That's why we work closely with our clients, to provide the right answers to highly individual needs and industry or country specific requirements. Based on cutting-edge technology, our in-house expertise designs customized reliable solutions for difficult uncommon wastes, integrates effective energy recovery systems and merges auxiliary equipment.

## INVESTMENT

The investment and operating cost vary greatly according to the type of incinerator. High tech rotary kiln incinerators require a higher invested capital, but are significant lower in operation and maintenance cost, compared to double chamber pyrolytic incinerators.

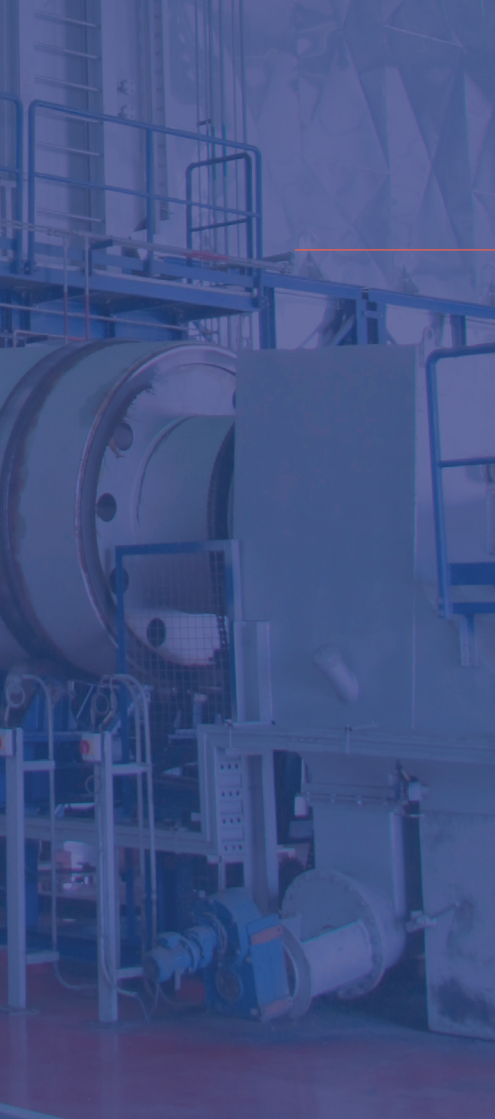
Rotary kiln incinerator lifetime normally ranges from 20-25 years, when well engineered and maintained.

For certain waste streams (hazardous, chemical, toxic, medical, infectious) the ROI is less than 3 years.



**Remember, a reliable DI incinerator is a satisfying money-maker, however, an unreliable system definitely is an expensive trouble-maker.**





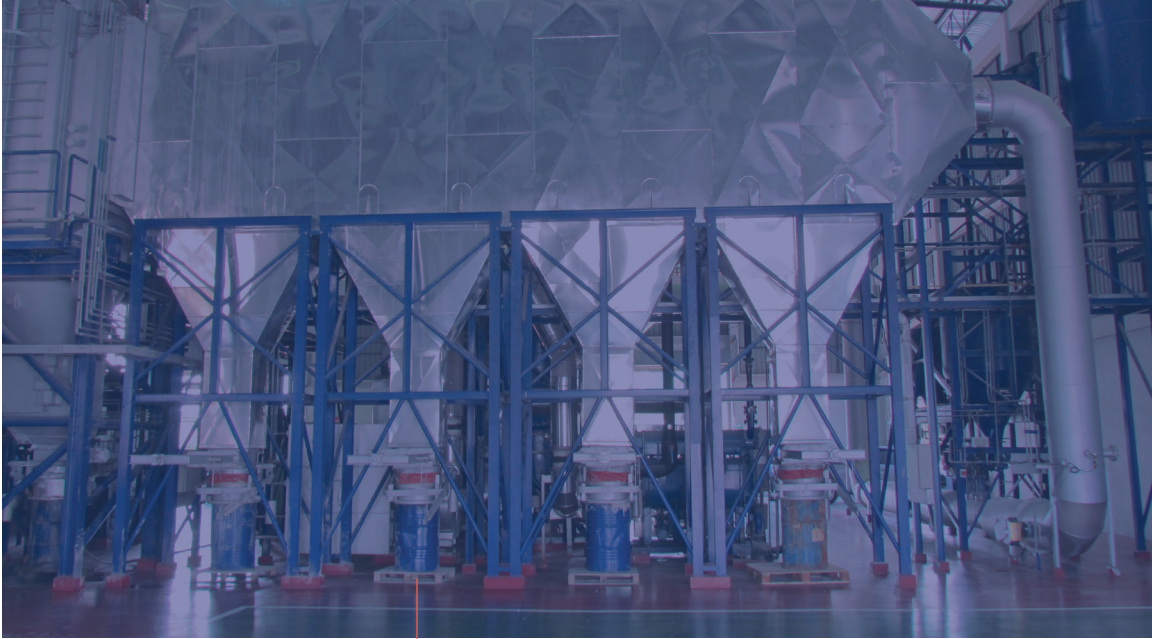
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## QUALITY GUARANTEE

We always provide value to our clients and never cut on savings in engineering, procurement and construction to make the incinerator facility cheaper.

Lower initial investment cost often results in unreliability and unscheduled interim maintenance shutdowns with costly repairs.

Our top-notch designs are built with state-of-the-art materials, industry-best instrumentation and supreme electrical hard-/software. Everything is thought out and planned from start to finish, to make sure that our clients are 100% satisfied and confident to receive a complete, reliable, high quality incinerator installation that will last for years.



## Key markets

Regardless of the sector, industry or the kind of combustible waste. Nowadays, our incinerators are tailored to make them fit and deployable for nearly any waste type which cannot be reused, recycled, discharged, landfilled or exported any longer.

If you want to know that your waste is qualified for our incinerators, contact us today.



## Product range

The design of our incinerators is primarily based on the actual waste calorific value and waste composition, defined in **thermal input capacity** (MW). A long-term waste analysis is the best root for designing the most appropriate incinerator.

The thermal input capacity of our standard incinerator assortment is situated between 1.5MW and 20MW, which corresponds with a throughput capacity of 250kg/hour up to 6,600kg/hour (6 t/d - 160 t/d). However, we can design any capacity according to the client's requirement.

# COUNTER-CURRENT ROTARY KILN INCINERATORS

## Standard product range

### THROUGHPUT CAPACITIES IN KG PER HOUR

Dutch Incinerators Model No.	Thermal Input HCV	Throughput at calorific value --->	Higher Calorific Value HCV	Higher Calorific Value HCV	Throughput at calorific value --->	Higher Calorific Value HCV	Higher Calorific Value HCV	Throughput at calorific value --->	Higher Calorific Value HCV	Higher Calorific Value HCV	Throughput at calorific value --->	Higher Calorific Value HCV	Higher Calorific Value HCV	Throughput at calorific value --->	Higher Calorific Value HCV	Higher Calorific Value HCV
<b>DI</b>	kW	kg/hr	kJ/kg	kcal/kg	kg/hr	kJ/kg	kcal/kg	kg/hr	kJ/kg	kcal/kg	kg/hr	kJ/kg	kcal/kg	kg/hr	kJ/kg	kcal/kg
<b>DI-1.5</b>	1,500	250	21,600	5,160	312.5	17,280	4,128	375	14,400	3,583	450	12,000	2,867	500	10,800	2,580
<b>DI-3</b>	3,000	500	21,600	5,160	625	17,280	4,128	750	14,400	3,583	900	12,000	2,867	1000	10,800	2,580
<b>DI-6</b>	6,000	1000	21,600	5,160	1250	17,280	4,128	1500	14,400	3,583	1800	12,000	2,867	2000	10,800	2,580
<b>DI-6 XL</b>	7,500	1250	21,600	5,160	1563	17,280	4,128	1875	14,400	3,583	2250	12,000	2,867	2500	10,800	2,580
<b>DI-12</b>	12,000	2000	21,600	5,160	2500	17,280	4,128	3000	14,400	3,583	3600	12,000	2,867	4000	10,800	2,580
<b>DI-15</b>	15,000	2500	21,600	5,160	3125	17,280	4,128	3750	14,400	3,583	4500	12,000	2,867	5000	10,800	2,580
<b>DI-20</b>	20,000	3333	21,600	5,160	4167	17,280	4,128	5000	14,400	3,583	6000	12,000	2,867	6667	10,800	2,580

### THROUGHPUT CAPACITIES IN TON PER DAY

Dutch Incinerators Model No.	Thermal Input HCV	Throughput at calorific value --->	Higher Calorific Value HCV	Higher Calorific Value HCV	Throughput at calorific value --->	Higher Calorific Value HCV	Higher Calorific Value HCV	Throughput at calorific value --->	Higher Calorific Value HCV	Higher Calorific Value HCV	Throughput at calorific value --->	Higher Calorific Value HCV	Higher Calorific Value HCV	Throughput at calorific value --->	Higher Calorific Value HCV	Higher Calorific Value HCV
<b>DI</b>	MW	ton/day	kJ/kg	kcal/kg	ton/day	kJ/kg	kcal/kg	ton/day	kJ/kg	kcal/kg	ton/day	kJ/kg	kcal/kg	ton/day	kJ/kg	kcal/kg
<b>DI-1.5</b>	1.5	6	21,600	5,160	7.5	17,280	4,128	9	14,400	3,583	10.8	12,000	2,867	12	10,800	2,580
<b>DI-3</b>	3	12	21,600	5,160	15	17,280	4,128	18	14,400	3,583	21.6	12,000	2,867	24	10,800	2,580
<b>DI-6</b>	6	24	21,600	5,160	30	17,280	4,128	36	14,400	3,583	43.2	12,000	2,867	48	10,800	2,580
<b>DI-6 XL</b>	7.5	30	21,600	5,160	37.5	17,280	4,128	45	14,400	3,583	54	12,000	2,867	60	10,800	2,580
<b>DI-12</b>	12	48	21,600	5,160	60	17,280	4,128	72	14,400	3,583	86.4	12,000	2,867	96	10,800	2,580
<b>DI-15</b>	15	60	21,600	5,160	75	17,280	4,128	90	14,400	3,583	108	12,000	2,867	120	10,800	2,580
<b>DI-20</b>	20	80	21,600	5,160	100	17,280	4,128	120	14,400	3,583	144	12,000	2,867	160	10,800	2,580



**DUTCH  
INCINERATORS**

Engineered for a cleaner tomorrow

Our engineers are the finest in the world and trained thoroughly to think outside the box, with the ongoing attitude that every problem has its own creative solution.

For further information or references about our rotary kiln incinerators and services, visit our website and contact us today.

Website: <https://dutchincinerators.nl>

Website: <https://dutchincinerators.com>