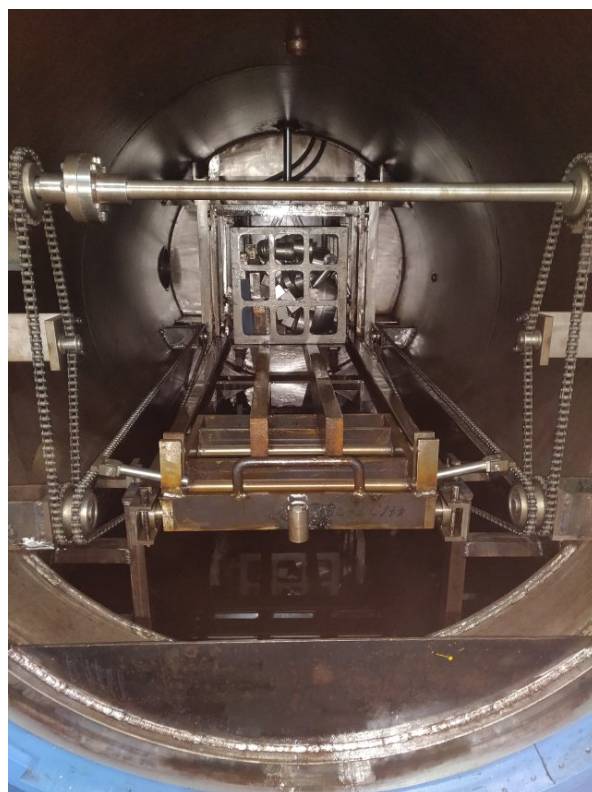


SYNTE PRODUCT TECHNICAL GUIDE

VTO Vacuum Oil Quenching Furnace

Reference configurations for double-chamber vacuum hardening and controlled oil quenching.

From published reference data to an application-matched furnace specification.



1320°C

Maximum temperature

4×10^{-1} Pa

Ultimate vacuum

±5°C

Temperature uniformity

100-800 kg

Published loading range

Use this document to

Screen the application, compare reference configurations, identify the engineering variables that change the proposal, and define measurable quotation and acceptance inputs.

Current online reference

<https://syn-v2.com/vacuum-heat-treatment-furnace/vacuum-oil-quenching-furnace/>

All published values are reference data for preliminary selection. Final configuration, supply scope and acceptance conditions are controlled by the project proposal and technical agreement.

SYNTE APPLICATION-LED ENGINEERING

01 / APPLICATION

Application fit and process boundary

Use the furnace family as a starting point. The correct configuration is determined by material, complete loaded geometry, process result, throughput and measurable acceptance evidence.

Application 01 Tool steel and mold steel hardening	Application 02 High-speed and alloy steels
Application 03 Spring steel and stainless steel	Application 04 Aerospace structural alloys
Application 05 Precision parts requiring hardness and bright surfaces	

Typical process route

01	02	03	04	05
Load	Vacuum heat	Transfer	Oil quench	Clean & verify
Basket, fixture and transfer geometry	Staged heating and soak	Interlocked move to quench chamber	Agitation and temperature control	Hardness, structure, distortion and surface

Stage	Primary control	RFQ / qualification question
Load	Basket, fixture and transfer geometry	Define input, control limit and evidence owner
Vacuum heat	Staged heating and soak	Define input, control limit and evidence owner
Transfer	Interlocked move to quench chamber	Define input, control limit and evidence owner
Oil quench	Agitation and temperature control	Define input, control limit and evidence owner
Clean & verify	Hardness, structure, distortion and surface	Define input, control limit and evidence owner

Suitable when

The heating chamber and quench chamber are engineered as one cycle | Oil condition and agitation belong in the process-control plan | Basket geometry must support both transfer and uniform quenching

Re-check the route when

Parts prioritizing a clean inert-gas finish may suit VTG | Oil type and allowable temperature range must be defined before final system sizing

SYNTE APPLICATION-LED ENGINEERING

02 / ENGINEERING

System architecture and sizing logic

SYNHTE reviews the furnace as a connected process system. Each subsystem is selected against the same loaded cycle and acceptance plan.

Subsystem	Engineering scope	Input that changes the choice
Process chamber	Usable zone, orientation, door/loading route and service clearances	Largest complete production load and site access
Hot zone	Heating material, insulation/shielding, zones and sensor arrangement	Temperature, chemistry, contamination and survey basis
Vacuum / gas	Pump train, valves, gauges, purge/backfill and process-gas control	Pressure range, outgassing, gas purity and cycle time
Cooling / quench	High-pressure gas circuit, controlled oil route, programmed cooling or natural/assisted cooling as applicable	Target metallurgical result, load density and utilities
Handling / tooling	Tray, fixture, setter, basket, carrier or press interface	Drawing, mass, center of gravity and repeatability
Controls & records	PLC/HMI recipes, interlocks, alarms, trends and batch identity	User roles, data fields, protocols and retention
Installation	Electrical, water, gas, exhaust, floor/loading and maintenance boundary	Site utility data and local safety requirements

Four engineering decisions that should stay connected

Transfer Distance, time, load stability and interlocks	Oil system Oil grade, tank duty, heating/cooling and agitation
Load Section, orientation, basket and gross mass	Safety/quality Fire protection basis, cleaning and acceptance

SYNHTE project path

Application review → configuration and utility definition → technical agreement → manufacturing and assembly → FAT / documentation → installation, SAT and process handover as agreed in the project scope.

03 / REFERENCE DATA

Published configuration envelope

The current VTO family range publishes $\pm 1^{\circ}\text{C}$ control accuracy, 4×10^{-1} Pa ultimate vacuum, 0.5 Pa/h pressure-rise data and a 2 bar gas-cooling option.

Model	Effective work zone W × H × L (mm)	Reference load (kg)	Heating power (kW)	Max. temp. (°C)
VTO-335	300 × 300 × 450	100	50	1320
VTO-446	400 × 400 × 600	200	65	1320
VTO-557	500 × 500 × 700	300	100	1320
VTO-669	600 × 600 × 900	500	150	1320
VTO-7712	700 × 700 × 1200	800	200	1320

How to read the table

The usable work zone must contain parts, fixtures, trays/setters, transfer clearance and the qualified sensor arrangement. Reference load is not a substitute for a gross loaded drawing. Vacuum, temperature and cooling values require an agreed test condition.

What changes the final configuration

Option / feature	Selection trigger	Engineering impact
Graphite or molybdenum hot zone	Material chemistry or contamination requirement	Changes heater/shielding compatibility and maximum useful temperature
Oil agitation and temperature-control configuration	Pump-down, cleanliness or working-pressure target	Changes pump train, gauges, isolation and acceptance tests
Automatic load-transfer mechanism	Load geometry, orientation or factory handling	Changes chamber orientation, tooling and clearances
Vacuum pumping package matched to cleanliness and cycle time	Cooling result, cycle time or surface requirement	Changes gas/oil/water duty and heat-rejection design
Custom baskets, fixtures and loading equipment	Traceability, integration or quality-system need	Changes controls, I/O, records and FAT/SAT cases
PLC/touchscreen controls, records and interlocks	Site utility, maintenance or safety constraint	Changes supplied auxiliaries, layout and interface scope

04 / QUALIFICATION

RFQ, proposal and acceptance framework

A precise enquiry reduces redesign and makes supplier proposals comparable. Attach drawings and define the pass/fail method wherever possible.

Input block	Information to provide	Preferred evidence
Material / process	Material grade, starting condition and target properties	Drawing, value, method or standard
Part / tooling	Part geometry, section thickness and distortion limit	Drawing, value, method or standard
Cycle / atmosphere	Fixture/basket envelope and total batch mass	Drawing, value, method or standard
Production	Oil type, quench severity and oil-temperature limits	Drawing, value, method or standard
Site / utilities	Cycle time, annual volume and loading method	Drawing, value, method or standard
Quality / records	Hardness, metallography, cleanliness and acceptance records	Drawing, value, method or standard

Recommended acceptance evidence

Thermal

Defined survey or loaded-cycle evidence, sensor locations and allowable deviation

Vacuum / atmosphere

Pump-down, ultimate/working pressure, pressure-rise or gas condition under stated test conditions

Functional

Recipes, interlocks, alarms, manual recovery and agreed utility-loss cases

Process result

Witness-load or sample evidence using agreed hardness, leak, density, dimensional, joint or metallographic methods

Documentation

Approved drawing, utilities, manuals, component list, records and test reports in the agreed scope

Site

Installation boundary, SAT checks, training and open-item closure responsibility

Direct engineering contact

Email info@synthe-corp.com or WhatsApp +86 155 3785 7393. Include this document title and the current product page:
<https://syn-v2.com/vacuum-heat-treatment-furnace/vacuum-oil-quenching-furnace/>

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