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Information contained in this catalog is that as of October 2017.
Note that specifications, dimensions and appearance contained in the catalog may change without notice for improvement.
Note that the color tone of the product on the catalog may appear different from that of the actual product for reasons attributable to printing.
Note that the addresses may be changed.

In order to use this product correctly and safely, please make sure to read this instruction manual thoroughly prior to use.

IHI and the symbol mark are the registered trademarks of IHI.
Supporting People, Cities, Society Behind the Scenes.

IHI Machinery and Furnace manufactures and sells products that improve the quality of mechanical parts, such as vacuum heat treatment furnaces, vacuum carburizing furnaces and new material manufacturing equipment. We do business not only throughout Japan, but around the globe.

IHI Machinery and Furnace offers solutions for our customers’ concerns and proactively engage in product maintenance and associated services. We boast a strong track record in a variety of fields- ranging from aircraft, industrial machinery, automotive parts and others.

More than 50 years experience and reliability
IHI has been supplying the highest quality furnaces to many customers in the above markets since the 60’s and contributing to the customer’s advanced technology.

Sophisticated Japanese Technology
As a market leader, IHI fulfills the high level and strict requirements from Japanese customers and provides technical advanced heat treatment systems.

Customer’s satisfaction by wide range products
IHI offers innovative and most versatile equipment to the customers by its rich experience of providing customized equipment.

IHI group synergy
As a general engineering corporation, IHI supports the customer with our synergy between each business area, global network and research & development. Especially in heat treatment environment, IHI is able to create new interesting value for the customer by synergy with our subsidiaries IHI VTN GmbH, IHI Ionbond AG and IHI Hauzer Tecno Coating B.V.
With over 1500 units installed around the world, we offer a variety of vacuum furnaces to suit our customers' products and heat treatment processes.

**Horizontal Vacuum Furnace**

**Applications**
- Tempering, quenching, annealing, solution production, magnetic processing, aging treatment, soldering, etc.

**Features**
- High temperature holding accuracy
  - Heaters positioned on the top/bottom/left/right of the heating chamber (PQ, RQ, VCH)
  - Heating output can be controlled in the 3 zones of front, middle, rear (PQ, RQ)
- Supports a wide cooling gas pressure range (87 - 600 kPa)
- Able to select the direction of cooling gas flow (Uprawards, downwards, up/downwards: RQ series, multi-flow: VCH series)
- Even cooling due to a cooling rectification plate
- Treated products look nice and bright

<table>
<thead>
<tr>
<th>Model</th>
<th>PQ-32/22/42</th>
<th>PQ-42/33/65</th>
<th>PQ-55/60/100</th>
<th>PQ-60/60/100/140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective work area (mm)</td>
<td>Width × Height × Depth</td>
<td>340×220×420</td>
<td>420×325×650</td>
<td>805×790×1260</td>
</tr>
<tr>
<td>Temperature Max</td>
<td>1320°C / Normal operating temperature: 540 - 1280°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling gas pressure</td>
<td>0.87 - 2.0 (bar) (Option: 2.8 (bar))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load (kg)</td>
<td>60</td>
<td>180</td>
<td>450</td>
<td>860</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>RQ (P) (C) 40X40X60</th>
<th>RQ (P) (C) 40X80X160</th>
<th>RQ (P) (C) 80X80X160</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective work area (mm)</td>
<td>Width × Height × Depth</td>
<td>400×400×600</td>
<td>650×650×1600</td>
</tr>
<tr>
<td>Temperature Max</td>
<td>1320°C / Normal operating temperature: 540 - 1280°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling gas pressure</td>
<td>0.87 - 2.8 (bar) (Option: 2.8 - 6.0 (bar))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load (kg)</td>
<td>200</td>
<td>600</td>
<td>1000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>GQ-23/18/40</th>
<th>GQ-34/23/58</th>
<th>GQ-52/43/83</th>
<th>GQ-67/69/1 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective work area (mm)</td>
<td>Width × Height × Depth</td>
<td>230×180×400</td>
<td>340×230×900</td>
<td>490×450×1800</td>
</tr>
<tr>
<td>Temperature Max</td>
<td>1320°C / Normal operating temperature: 540 - 1280°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling gas pressure</td>
<td>0.87 - 2.8 (bar) (Option: 2.8 - 6.0 (bar))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load (kg)</td>
<td>35</td>
<td>90</td>
<td>210</td>
<td>250</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>VCH-06/09/12</th>
<th>VCH-18/10/16</th>
<th>VCH-12/10/30</th>
<th>VCH-18/16/24</th>
<th>VCH-24/24/38</th>
<th>VCH-24/38/38</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective work area (mm)</td>
<td>Width × Height × Depth</td>
<td>200×15×30</td>
<td>400×400×400</td>
<td>600×360×760</td>
<td>460×460×660</td>
<td>810×615×920</td>
</tr>
<tr>
<td>Temperature Max</td>
<td>1320°C / Normal operating temperature: 540 - 1280°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load (kg)</td>
<td>95</td>
<td>90</td>
<td>210</td>
<td>250</td>
<td>450</td>
<td>600</td>
</tr>
</tbody>
</table>

*Models available with pressurized gas cooling (PG) and multi-flow (M) options

**Multi-chamber Vacuum Furnace**

**Applications**
- Tempering, quenching, annealing, solution production, magnetic processing, aging treatment, soldering, etc.

**Features**
- High temperature holding accuracy
  - Heaters positioned around the circumference (360°) of the heating chamber
  - Heating output can be controlled in the 3 zones of front, middle, rear
- Supports a wide cooling gas pressure range (87 kPa: VGQ, 87 - 280 kPa: VPQ)
- Able to select cooling method
- Treated products look nice and bright

<table>
<thead>
<tr>
<th>Model</th>
<th>VGG-60/120</th>
<th>VGG-80/160</th>
<th>VGG-120/160</th>
<th>VGG-120/120</th>
<th>VGG-180/160</th>
<th>VGG-200/300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective work area (mm)</td>
<td>Width × Height × Depth</td>
<td>600×800</td>
<td>800×800×1200</td>
<td>1200×800×1200</td>
<td>1600×800×1000</td>
<td>2000×2400×1000</td>
</tr>
<tr>
<td>Temperature Max</td>
<td>1320°C / Normal operating temperature: 540 - 1280°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load (kg)</td>
<td>600</td>
<td>900</td>
<td>900</td>
<td>1200</td>
<td>1500</td>
<td>1800</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>GQ-3C-61/46/91</th>
<th>GQ-3C-91/76/140</th>
<th>GQ-3C-120/90/180</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective work area (mm)</td>
<td>Width × Height × Depth</td>
<td>610×460×910</td>
<td>910×760×1400</td>
</tr>
<tr>
<td>Temperature Max</td>
<td>1300°C / Normal operating temperature: 540 - 1280°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load (kg)</td>
<td>450</td>
<td>1100</td>
<td>2500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>NVPT-42/40/65</th>
<th>NVPT-60/60/100</th>
<th>NVPT-80/80/130</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective work area (mm)</td>
<td>Width × Height × Depth</td>
<td>420×400×650</td>
<td>600×600×1000</td>
</tr>
<tr>
<td>Temperature Max</td>
<td>750°C / Normal operating temperature: 150 - 700°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load (kg)</td>
<td>180</td>
<td>600</td>
<td>800</td>
</tr>
</tbody>
</table>

**Vertical Vacuum Furnace**

**Applications**
- Tempering, quenching, annealing, solution production, magnetic processing, aging treatment, soldering, etc.

**Features**
- Enables the heat treatment of long parts and large/heavy parts
- Positioned around the circumference (360°) of the heating chamber, therefore temperature holding accuracy is enhanced. The large model has heaters on top and bottom for further performance enhancement.
- Supports a wide cooling gas pressure range (87 kPa: VGQ, 87 - 280 kPa: VPQ)
- Able to select the direction of cooling gas flow (Uprawards, downwards, up/downwards: RQ series, multi-flow: VCH series)
- Even cooling due to a cooling rectification plate
- Treated products look nice and bright

<table>
<thead>
<tr>
<th>Model</th>
<th>VGQ-60/120</th>
<th>VGQ-80/160</th>
<th>VGQ-120/160</th>
<th>VGQ-120/120</th>
<th>VGQ-180/160</th>
<th>VGQ-200/300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective work area (mm)</td>
<td>Width × Height × Depth</td>
<td>600×800</td>
<td>800×800×1200</td>
<td>1200×800×1200</td>
<td>1600×800×1000</td>
<td>2000×2400×1000</td>
</tr>
<tr>
<td>Temperature Max</td>
<td>1320°C / Normal operating temperature: 540 - 1280°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load (kg)</td>
<td>600</td>
<td>900</td>
<td>900</td>
<td>1200</td>
<td>1500</td>
<td>1800</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>GQ-3C-61/46/91</th>
<th>GQ-3C-91/76/140</th>
<th>GQ-3C-120/90/180</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective work area (mm)</td>
<td>Width × Height × Depth</td>
<td>610×460×910</td>
<td>910×760×1400</td>
</tr>
<tr>
<td>Temperature Max</td>
<td>1300°C / Normal operating temperature: 540 - 1280°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load (kg)</td>
<td>450</td>
<td>1100</td>
<td>2500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>NVPT-42/40/65</th>
<th>NVPT-60/60/100</th>
<th>NVPT-80/80/130</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective work area (mm)</td>
<td>Width × Height × Depth</td>
<td>420×400×650</td>
<td>600×600×1000</td>
</tr>
<tr>
<td>Temperature Max</td>
<td>750°C / Normal operating temperature: 150 - 700°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load (kg)</td>
<td>180</td>
<td>600</td>
<td>800</td>
</tr>
</tbody>
</table>
Fully-automatic batch vacuum carburizing furnace

Vacuum Carburizing Furnace (VCB-Type)

**Features**
- High reliability
- Low maintenance frequency, therefore maintenance costs can be reduced
- Low utilities costs
- Capable of a purge out with minimized soot generation
- High energy efficiency and shorter treatment time due to high-temperature treatment
- Treated products look nice and bright

**Applications**
- Carburizing, Oil quenching

<table>
<thead>
<tr>
<th>Model</th>
<th>Furnace internal effective dimensions (mm)</th>
<th>Load (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCB-1V</td>
<td>600 x 600 x 1200</td>
<td>650</td>
</tr>
<tr>
<td>VCB-2V</td>
<td>600 x 600 x 1200</td>
<td>950</td>
</tr>
<tr>
<td>VCB-3V</td>
<td>700 x 600 x 1200</td>
<td>1000</td>
</tr>
</tbody>
</table>

* Tray included in height

Supports various sizes. By using before/after various heat treatment such as carburizing and quenching it is possible to provide the optimal state for heat treatment.

Vacuum Degreaser (HWV-V)

**Features**
- Improved cleaning performance with steam cleaning and immersion cleaning
- Reduced waste with a mechanism for solvent distillation and regeneration
- Low maintenance frequency
- Low utilities costs
- Improved cleaning performance in deep holes and blind holes, etc.
- Equipped with internal mechanisms such as immersion cleaning, shower cleaning, steam cleaning and drying

**Applications**
- Removing and cleaning various oils (cutting oil, tempering oil, etc.) attached to the product before/after heat treatment

<table>
<thead>
<tr>
<th>Model</th>
<th>Furnace internal effective dimensions (mm)</th>
<th>Load (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HWV-2V</td>
<td>600 x 600 x 1200</td>
<td>250</td>
</tr>
<tr>
<td>HWV-3V</td>
<td>600 x 600 x 1200</td>
<td>950</td>
</tr>
<tr>
<td>HWV-4V</td>
<td>700 x 700 x 1200</td>
<td>1000</td>
</tr>
</tbody>
</table>

Built-in cryo-drying system: drying time and cleaning cycle time is reduced—making it highly energy efficient. Moreover, repeating the steam and shower cleaning process, the result on treated parts of various shapes is enhanced/improved dramatically.

Vacuum Degreaser (IWV-34C)

**Features**
- Reduced cleaning time and high cleaning performance
- High energy-saving performance
- Minimal solvent
- Low running costs

**Applications**
- Removing and cleaning various oils (cutting oil, tempering oil, etc.) attached to the product before/after heat treatment

<table>
<thead>
<tr>
<th>Model</th>
<th>Furnace internal effective dimensions (mm)</th>
<th>Load (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IWV-34C</td>
<td>600 x 600 x 1200</td>
<td>1000</td>
</tr>
</tbody>
</table>

An low-maintenance/easy-maintenance equipment/device with a configuration which focuses on carburizing and quenching.

Mass-Production Vacuum Carburizers (V-Cell)

**Product configuration**
- Carburizing chambers: 6
  (additional chambers possible)
- Transfer cart with an oil quenching chamber: 1
- Loading/unloading mechanism: 1
- Can be combined with a pre/post-degreasing and cleaning machine and a tempering furnace to build a vacuum carburizing line

Fully-automatic and sophisticated multi-chamber vacuum carburizing furnace. Achieving high productivity while keeping initial costs to a minimum.

Multi-Chamber Vacuum Carburizing Furnace (V-MALS)

**Product configuration**
- Heating chambers: 1-3
- Oil cooling chamber: 1
- Loading/unloading mechanism: 1

Applications
- Carburizing, Oil quenching
- Capable of a purge out with minimized soot generation
- High energy efficiency and shorter treatment time due to high-temperature treatment
- Treated products look nice and bright

<table>
<thead>
<tr>
<th>Model</th>
<th>Furnace internal effective dimensions (mm)</th>
<th>Load (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-MALS</td>
<td>600 x 600 x 1200</td>
<td>850</td>
</tr>
</tbody>
</table>

* Tray included in height

<table>
<thead>
<tr>
<th>Model</th>
<th>Furnace internal effective dimensions (mm)</th>
<th>Load (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IWV-34C</td>
<td>600 x 600 x 1200</td>
<td>1000</td>
</tr>
</tbody>
</table>

* Tray included in height
Other Equipment

● Carbon fiber manufacturing equipment
● Carbon composite manufacturing equipment

Overview of the Hot Press

IHI Machinery and Furnace began manufacturing hot presses in 1984 and has carried out several model changes since to respond to customers’ applications. We manufacture hot presses for sintering that focus on sputtering targets and semiconductor ceramics, as well as hot presses for diffusion bonding that focus on heat exchangers.

Applications

Ceramic, target material, electronic material substrate

Features

● Able to fabricate equipment to suit the treated product size
● Achieves high temperature holding accuracy applying vacuum furnace technology
● Supports a wide temperature range (up to 2600°C)
● High pushing force (10,000 kN), high surface pressure treatment (70 Mpa) possible
● Able to press from above and below
● Supporting with high-speed cooling
● C/C molds can be adopted for large workpieces

Suitable for the diffusion bonding, soldering and molding of metal, ceramics, compound materials, etc.

Hot Press for Sintering

Applications

Diffusion bonding, soldering and molding of heat exchangers, molds, metals and ceramics

Features

● Able to fabricate equipment to suit the treated product size
● Achieves high temperature holding accuracy applying vacuum furnace technology
● Supports a wide temperature range (up to 1600°C)
● Able to select the no. of press axes to suit the treated product size (Experience in 1 – 24 axes to date)
● Able to support wide pushing force and surface pressure range
● Supports high-speed cooling

Other Equipment

● Multi-chamber HP
● Hot-forming machine
● Hybrid type
(Resistance heating + conductive heating)

Overview of the Hot Press

From our wealth of experience and know-how, we aim to propose the right equipment based on customer specific treatment processes.

Degreasing and Sintering Furnace

Applications

Sintering: ceramic, carbine powder, heat-resistant allow powder, etc.

Features

● High temperature distribution performance due to optimal furnace internal/heater design
● Capable of high heat treatment in pressurized atmospheres
● Able to select exhaust control line/atmosphere control method to suit the specific treatment process

(Typical specifications)

<table>
<thead>
<tr>
<th>Model</th>
<th>Effective work area (mm) Width × Height × Depth</th>
<th>Temperature</th>
<th>Ultimate pressure</th>
<th>Overall weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(D) SPS-30/30/60 (120)</td>
<td>300 × 300 × 600</td>
<td>Max. 1600°C / 1200°C</td>
<td>Max. 9 MPa</td>
<td>150 (300)</td>
</tr>
<tr>
<td>(D) SPS-40/40/80</td>
<td>400 × 400 × 800</td>
<td>500 × 500 × 1000</td>
<td>5.9 MPa</td>
<td>800</td>
</tr>
</tbody>
</table>

Diffusion bonding, soldering and molding of heat exchangers, molds, metals and ceramics

Applications

Degreasing, High Pressure Sintering Furnace

Applications

Degreasing – sintering HP treatment (carbine tools, etc.)

Features

● High safety level backed by a long delivery track record and wealth of experience
● Excellent temperature distribution due to heater arrangement and control system
● Capable of high-speed cooling due to a cooling fan and gas fan cooling system

Other Equipment

● Graphitizing furnace
● Purification furnace
● Carbonization furnace

We pride ourselves with our flexibility towards a variety of customer needs, so please don’t hesitate to contact us with any specific request (e.g. Sample testing, contract processing, etc.)
Role of the Heat Treatment Technical Center

Heat treatment processes: Accumulation (organization) of fundamental data/Pursuit of applied technologies

- Improve Center’s capabilities
- 1. Collecting and organizing fundamental data on vacuum carburizing/vacuum heat treatment
- 2. Collecting information relating to heat treatment process technology (Japan/overseas, other manufacturers)
- 3. Pursuit applied technologies 2017 onwards: Accumulated effects and know-how of carburizing + nitriding

Support for product businesses, heat treatment contract business (high-level processes, etc.)

- 1. Sales support
  - Support for specifications study relating to target equipment
  - Verification of customer’s requested specifications with a sample test
- 2. Post-order support
  - Pre-installation verifications on equipment when product quality is a condition for acceptance (essentially this is confirmed prior to obtaining order)
  - Quality confirmation upon delivery

Improving customer satisfaction level

- 1. Existing equipment
  - Advise on concerns relating to heat treatment processes
  - Provide solutions to problems relating to heat treatment processes (customer support)
- 2. Technological marketing

[Equipment]
- Carburizing furnace – 3 (cold, semi-hot) (with carburizing/nitriding function)
- Vacuum furnace – 2 RO (6 bar, N2, Ar, H2)
- Small lot treatment equipment
- Cleaning machine – 2 cryo-dryers (C Type) Immersion cryo (V-C Type)
- Sintering furnace demo machine
- Hot press demo machine (planned)
- V-CELL demo machine (planned)
- Electron probe microanalyzer EPMA
- Carbon analyzer EMA
IHI Machinery and Furnace Co., Ltd.

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In order to use this product correctly and safely, please make sure to read this instruction manual thoroughly prior to use.

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