INTERNALS FOR DOWN FLOW REACTORS
Johnson Screens® designs and manufactures a wide range of vessel internals for media retention. Among these innovative products is a line of internals used in down flow or up flow systems to retain the often-costly media and to provide a collection area for the process flow across the entire vessel diameter or length.

Because of their strength, durability and flow characteristics, our support grid and distributor tray systems are widely used in hydrotreaters, desulfurizers, hydrocrackers, molecular sieves, sand filters, gas sweeteners and other absorption systems.

Johnson screens have high open area, non-plugging slot design and present a stable, smooth interface with the media.
JOHNSON STANDARD DESIGNS SOLVE MOST PROBLEMS

There are multiple advantages in using Johnson® screens for demanding media retention applications:

• JOHNSON SCREENS ARE EXTREMELY STRONG
  Made of wires and rods welded at every intersection, Johnson screens have exceptional resistance to collapsing or buckling even in operations such as hydrocracking and desulfurizing where screens must withstand loads of 350 kPa or more.

• JOHNSON SCREENS OFFER PRECISE MEDIA RETENTION
  Johnson support grids can have slots as narrow as 0.002 in. / 0.05 mm to dependably retain even very small catalyst, resin or molecular sieves. Despite the narrowness of these individual slots, the screen has a much higher total open area than grids using wire mesh on grating. This increased open area translates directly into superior process efficiency.

• JOHNSON SCREENS PROVIDE A STABLE INTERFACE
  Unlike wire mesh, Johnson screens directly retain the media without an intermediate layer of inert balls. The smooth surface of the screen also reduces abrasion of the catalyst.

• JOHNSON SCREENS ARE VIRTUALLY MAINTENANCE-FREE
  Once installed, the screens require very little maintenance. Their special slot design virtually eliminates plugging but if it should ever occur, cleaning with a wire brush is quick and easy and can be done without fear or damage to the screen surface.

• JOHNSON SCREENS HAVE MAXIMUM DESIGN FLEXIBILITY
  Johnson support grids are fabricated in a variety of custom shapes and sizes to meet any process or vessel requirements. Made of variety of materials such as type 304, 316, 316L, 321, 347 and 410S stainless steel and exotic alloys, the grids may also be fabricated in sections and include manways, dump ports and other features required by vessel or operational constraints.
Johnson Screens designs and fabricates virtually every vessel internal you may require for media retention in down flow processes. These include support grids, distributor trays, quench pipes, transfer pipes, mixing assemblies, support structures, vee-wire trash baskets, inlet distributors and outlet baskets. In short, everything you need to move, distribute and collect fluid flow through the vessel can be supplied – and supported by Johnson Screens.

Quality documentation is available, including statistical process control charts, mill certificates, quality plans, inspection and test reports, as-built drawings and various other reports and certifications.

PMI may be conducted on all incoming material and is available for all completed product types.

Treatment before and after fabrication is available, including passivation, pickling, stress relieving, polishing and plating.

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Note: not all wire shapes are available in all materials. All dimensions and names are subject to change without notice. Most commonly used wire shapes are shown here on the right.
THE PRODUCTS

SUPPORT GRIDS

Johnson Screens® leads the way in applying innovative technology to industrial screen problems. No matter what obstacles are present in the vessel, we can manufacture grids that accommodate many design features such as dump-tubes, thermowells, thermocouples and other special requirements. Johnson grids can be made into a variety of shapes including pie-shaped panels and chordal sections.

To provide access to the underside of the grid, a removable manway can be installed.

Our designs vary to accommodate different load, temperature and special configurations. To deal with the extreme loads often encountered in media retention systems, we typically recommend side-by-side (SBS) construction (left). In this design, large rectangular bars are welded to the screen support rods, creating a very strong structure.

For lighter loads, single rod (SR) construction may be used. We can also design grids with larger, heavier flanges, which allows the grid to span greater distances, minimizing the need for support structure.

Dehydrator systems with cyclic pressure and temperature impose difficult constraints on grid design. Working together, we can define the correct vessel support ring size, grid metallurgy and perimeter seal to achieve trouble-free operation.

In horizontal vessels, the screen is placed below the center line and extends the full length of the vessel. Depending on vessel size, the screen may span the entire distance or rest on one or more support beams. As with circular grids for vertical vessels, the screen is often made in flanged sections to facilitate installation.

In retrofitting fixed bed systems, damaged wire mesh is removed, leaving still-serviceable support grating in place. Johnson screens are then installed over the grating, creating a very strong, efficient and long-lasting system.

Johnson support grids can be fitted with manways lifting lugs, thermowell guide and catalyst pump tubes.

In rerouting txeo oeo systems, damaged wire mesh is removed, leaving still-serviceable support grating in place. Johnson screens are then installed over the grating, creating a very strong, efficient and long-lasting system.
DISTRIBUTOR TRAYS

Johnson gas/liquid distributor trays/mixing chambers are key components in the primary refinery applications of hydrocracking, hydrotreating and hydrodesulphurization.

High performance trays and mixing chambers provide excellent mixing of incoming gas and liquid flows.

Insuring an even distribution over the entire reactor cross section results in a uniform flow pattern and optimum catalyst performance.

Made of an assembly of bolted plates and distributor nozzles/chimneys, Johnson trays also include support beams, manways, gaskets and all the hardware required for installation and testing. Pre-assembly of the complete package is offered in order to make sure that all parts match together. Tightness of all joints is defined in the factory thus avoiding by-pass and mal-distribution of the flow in the catalyst bed upon final assembly in the vessel.
HEADER LATERAL SYSTEMS

HEADER LATERAL SYSTEMS PROVIDE EVEN, EFFECTIVE DISTRIBUTION AND COLLECTION

These assemblies, which consist of a series of screen laterals attached to either a central header or hub, allow designers to provide uniform flow through treatment media at a wide range of rates and for a variety of vessel sizes and shapes. A typical vessel would use a header lateral assembly at the top to distribute inflow evenly across the bed surface. A second assembly, located near the vessel bottom, collects the treated flow and passes it either through the vessel sidewall or – by attaching the laterals to a central hub – out the vessel bottom. For counter-current flow, a similar distribution and collection system can be designed. Johnson Screens has proprietary designs for chromatographic separation of difficult mixtures: the headers and laterals are special designs involving precise distribution and very pure separation.

Several available design options can be chosen to achieve uniform, controlled rate flow and collection.

• Lateral spacing, length, diameter and slot opening size is based on individual system needs. Slot sizes can be any width from 0.002 in. / 0.05 mm up in 0.001 in. / 0.025 mm increments. Laterals can be any diameter from 3/4 in. / 20 mm up. The number and spacing of laterals can also be varied.
• Laterals attach to headers or hubs by any desired method, including threaded fittings, couplings or flanges.
• Perforated pipe liners can be used inside screen laterals for increased collapse resistance and enhanced flow distribution.

Header lateral design for horizontal vessels is also used for square or rectangular underdrains.

Hub lateral design is economical possibility for smaller vertical vessels.

Header lateral design provides most effective distribution for vertical vessels and can be either side mounted or have a center outlet.
SCALE TRAPS / DISTRIBUTOR BASKETS

SCALE TRAPS EXTEND BEDLIFE AND INCREASE FLOW AREA

Down flow processes often carry metallic contaminants or scale, which can quickly plug the top surface of a vessel’s catalyst bed. Johnson screens effectively increase the surface area of the bed which disperses the scale over a wider area, thus extending the bed’s useful life. This is easily done by placing an array of Johnson screens in the upper part of the catalyst bed where, depending on screen size and placement, they can increase the total effective bed area by up to 400% and trap most of the contaminants present in the flow. Not only do the screens resist normal operating stresses, but they can also survive being dumped with the catalyst. And when it’s time for routine cleaning, they can be vigorously wire brushed or blasted without breaking or tearing.

Standard Johnson scale traps range from:

- **OD**: 4 in. / 102 mm to 6-5/8 in. / 168 mm
- **Length**: 11.8 in. / 300 mm to 39.4 in. / 1000 mm
- **Slot opening**: 0.020 in. / 0.5 mm to 0.060 in. / 1.5 mm

Total screen open area can be as high as 50%.
OUTLET BASKETS

In down flow processes, a screen at the outlet is usually necessary to prevent treatment media from migrating out of the vessel. This function is best performed with a Johnson Screens® outlet basket. Made of wires and rods welded at every intersection, Johnson screens have exceptional resistance to collapsing or buckling even under extreme loads and high temperatures.

The screens may be built as a single unit or segmented for installation through a manway. Sizes and installation options are available for particular vessel requirements.

Optimum performance of an outlet basket requires proper relationship of diameter-to-length and side-to-top open area. Johnson can assist in defining your final design.

Vee-wire outlet baskets can directly retain the catalyst without needing transition layers on inert balls.

Special fabrication and cleaning techniques allow the baskets to be used in high purity gas service.
GLOBAL SERVICE SUPPLIER: FROM EXPERTISE AND INSPECTION TO INSTALLATION AND MAINTENANCE

Our experience with a great variety of industries ranging from refining, petrochemical applications and chemical uses to water well, pulp & paper processing, mining and architecture gives us a wealth of knowledge which we make available to you through our field service teams and in-house technical support groups.

We are experts in major processes including Catalytic Reforming, Styrene Dehydrogenation, LAB, Sulfur Treatment, HDS/HDT, Ammonia Conversion, Mercury Removal, Claus, etc.

We apply this expertise from initial product design through proprietary fabrication to testing, installation and start-up and have the people to solve a problem that may arise at any point in a product life cycle.

A TEAM OF HIGHLY SKILLED WELDERS

No matter how distant or difficult the problem, we can get a team of experienced welders to your site. Each of them has personal experience in repair and installation of screens and other vessel internals. All have considerable expertise in TIG/MIG and other welding techniques, including work on exotic alloys.

Thanks to their experience, these welders can operate autonomously with little or no supervision under the most demanding conditions, including confined space work in remote sites. These teams need no intermediate contractor to direct their work and typically report directly to our client’s on-site management.

For new project installations, we will field a team of experienced fitters, technicians and supervisory engineers to ensure a smooth, trouble-free start-up.
AT JOHNSON SCREENS®, OUR LARGE RANGE OF PRECISION ENGINEERING EQUIPMENT IS SUITABLE FOR MORE APPLICATIONS THAN EVER.

It is our aim to assist you in maximizing your operational efficiency and supporting you in finding long term trouble-free solutions. Discover our ever expanding range of products, designed with your needs in mind:

**MINING**
- Centrifuge Baskets
- Pipo Two™ Modular Screening Systems
- Pipo Three™ Modular Screening Systems
- Polyurethane & Rubber Screen Panels
- Woven Wire
- Vee Wire™
- Sieve Bends
- Trommel Mats

**WATERWELL SCREENS**
- Well screens
- Riser Pipes
- Environmental Monitoring Screens
- Drilling Fluids
- Rehabilitation Chemicals/Nuwell

**ARCHITECTURE & CONSTRUCTION**
- Column covers
- Urban development
- Frontages
- Floor gratings
- Ventilation grids
- Sun control screens
- Custom lighting
- Furniture
- Walls/Wall partitions

**GENERAL INDUSTRIAL**
- Flat Panels
- Sieve Bends
- Cylindrical Screens
- Architectural Products
- Custom Polyurethane Casting
- Corn Wet Milling (Starch and Sieves)
- Sugar Processing Products

**WATER PROCESS**
- Passive Intake Screens
- In-Line Self-Cleaning Filters
- Nozzles
- Triton® Underdrain Systems
- Fish Diversion Screens
- Collectors/Distributors
- Vessel Internals

**PETROCHEMICAL AND REFINING**
- Centrepipes
- Outer Baskets
- Scallops
- Support Grids & Beams
- Outlet Collectors
- Lateral
- Distributor Trays

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