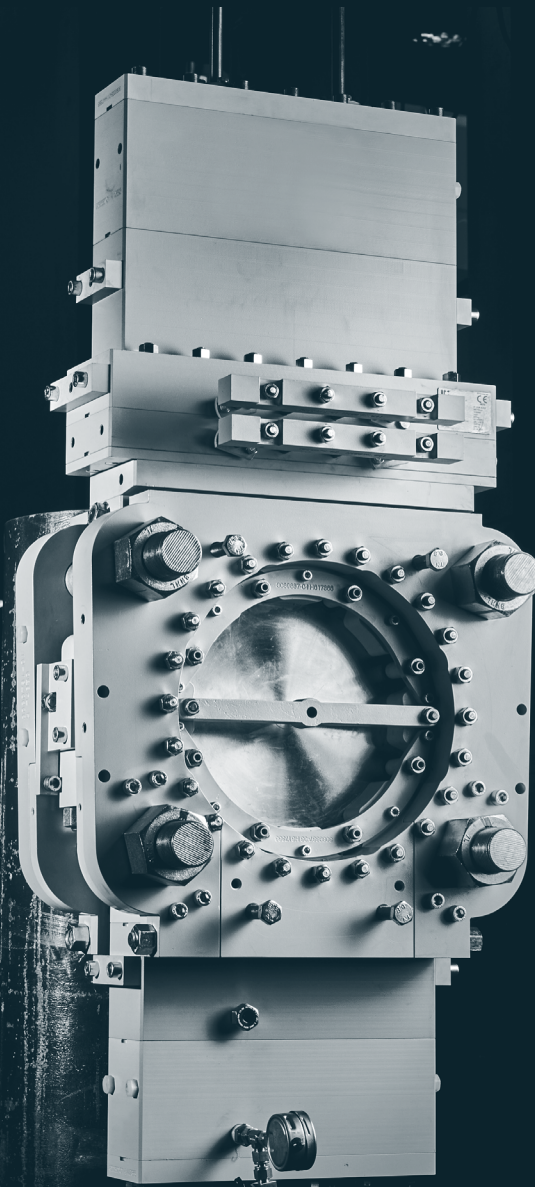


AOGV

Mechanical Isolation System

Simple. Safe. Smart.





AOGV

Mechanical Isolation Tool

Developed by Izomax, the AOGV Mechanical Isolation Tool can insert and remove an isolation spade on any live flange pair to create a zero-energy zone where inspection, modification and maintenance work can be performed safely and efficiently whilst production is maintained.

APPLICATIONS INCLUDE:

- On-site repair of valves and valve replacement
- Repair and modifications of parts of process facilities
- Retrospective installation of equipment
- Allow safe entry of vessels for maintenance, repair or cleaning
- Tie-ins of new wells, streams and equipment without shutdown

The AOGV tool has been approved and deployed by oil and gas supermajors and multinational NOCs across upstream, downstream, and integrated gas assets.





How does the AOGV work?

The Izomax AOGV Mechanical Isolation System is assembled in sections over any live flange pair, upstream or downstream of the pipework or equipment requiring intervention.

Sealing on the flange circumference and the flange bolt holes, the pipe pressure and inventory is contained within the AOGV housing. The flanges are separated, the gasket removed, and a spade is inserted for isolation purposes.

The AOGV tool is then disassembled and moved to the next location leaving the flange pair and pipework in the same condition as it was pre-intervention.



Positive Isolation

Positive Isolation is regarded as the most secure method for energy isolation and the use of the AOGV facilitates:

1. Spool removal: removal of a piped section or spool piece and blanking the live end – also called 'air gapping'.
2. Blind isolation: insertion of a blind between flanges (spade).



Environmental impact

The AOGV reduces the isolated area, meaning that more of the process inventory is left in the plant, reducing the risk of spill and volume of emissions.

- AOGV enables reduced requirement for drainage, venting, purging and flushing
- Reduces volumes to be gas-freed and flared
- Minimises requirements for storing or transport of drained fluids
- Minimises disposal of unwanted fluids
- Minimises release of Volatile Organic Compounds to the environment



Minimise your isolation impact

Passing valves and leaking flanges is a challenge in any process plant. Built-in isolation points can require partial facility shutdowns and the ejection and flushing of large inventory volumes. Typically, this type of work must wait for – or trigger – a full or partial facility shutdown, leading to significant production loss and increased exposure to risk for personnel.

By bringing the isolation point closer to the point of interest, the AOGV reduces the area impacted by the work, negating the likelihood of shutdown and a large ejection of inventory.

The AOGV is designed to ensure facility downtime is kept to a minimum, asset integrity is maintained, and the risk is mitigated to “as low as reasonably practicable”.

AOGV TIMELINE 2016–2025

2016

- | | | | | |
|--------------|-------------------------------|---|---------------------|---|
| 2016 | 2017 MAR | 2018 AUG | 2019 AUG | 2019 SEP |
| AOGV concept | First use of a prototype AOGV | First High pressure AOGV job successfully executed (150Bar/2175psi) | AOGV Patent Awarded | AOGV case jointly presented at Offshore Europe by BP and Izomax |

- | | | | | |
|------------------------------------|----------------------------------|---|--|---|
| 2021 OCT | 2021 AUG | 2021 MAY | 2020 AUG | 2020 MAY |
| AOGV job #50 Successfully Executed | First cryogenic AOGV application | First AOGV Global Technology Release (approval) by a “Supermajor” | Finalist for the Offshore Northern Seas Innovation Award | First frame agreement awarded by NOC for delivery of AOGV technology and services |

- | | | | | |
|--|--|-------------------------------------|---|--|
| 2022 MAR | 2022 APR | 2022 | 2023 AUG | 2023 |
| Order received for the first G1.0 butterfly valve AOGV | Qualification of the first Compact Flange AOGV | AOGV job #100 Successfully executed | 1st GRE application successfully executed, with several repeat projects during 2024 | Houston and Aberdeen facilities opened with full-time staff in place |

2025

- | | | |
|------------------------------|---------------------|---|
| 2025 JAN | 2024 JUL | 2024 MAY |
| Izomax moves to new facility | Job # 200 completed | AOGV qualified & Global MSA in place with Shell |



Increases maintenance flexibility

The AOGV can insert an isolation spade at any live flange pair, isolating individual pieces of equipment or sections of the process plant where no other isolation points are available. This makes it possible to execute inspection, modification and maintenance work, as and when needed, without interruption to production.

The AOGV technology provides quantifiable value by reducing the time spent “in-plant” and the area of the facility impacted. Compared to alternatives, the AOGV allows:

- Isolation of individual parts of equipment where no other means are provided or available
- Execution of work outside of a turnaround (TAR), increasing asset uptime (reliability)
- No requirement for “hot work”
- No permanent alteration to the pipework
- Reduction in maintenance schedules by minimising isolation impacts
- Reduction in drainage, venting, purging and flushing time and cost
- Maintained production through simplified isolation

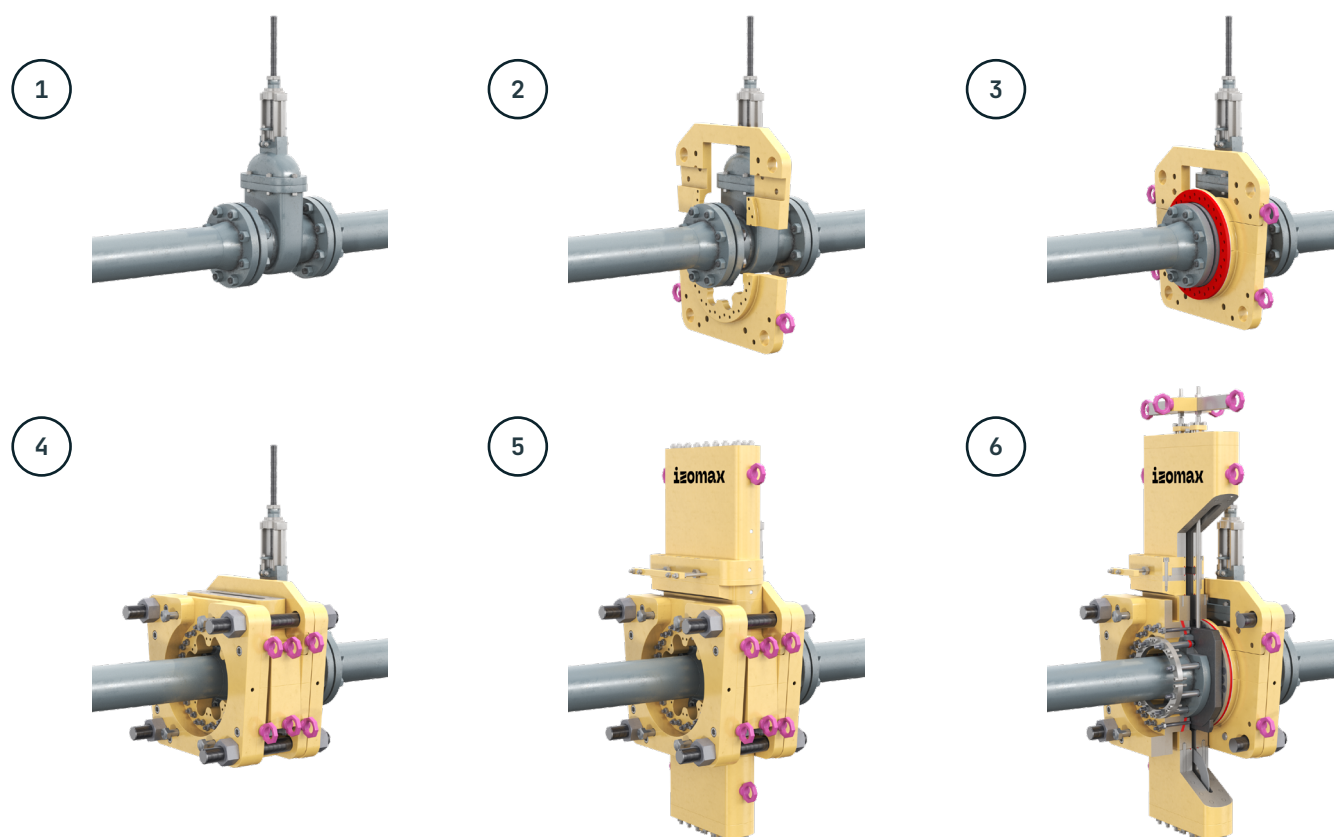
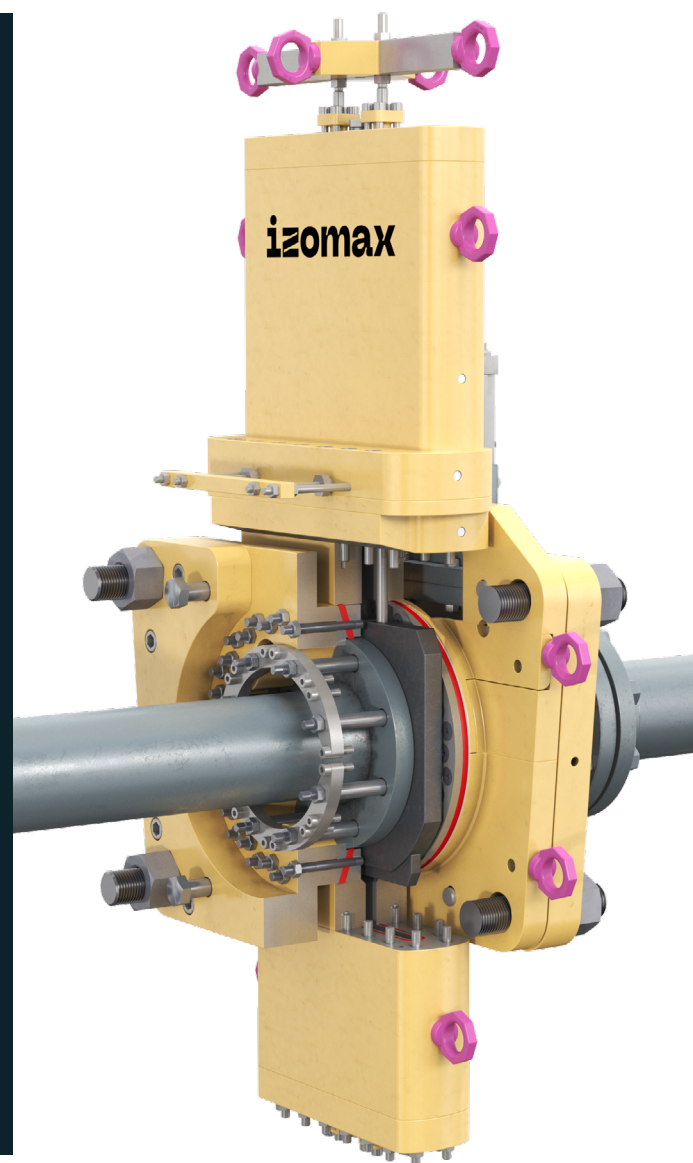
The AOGV is tested to and complies with all relevant regulations and standards – PED2014/68/EU, EN 13445, ASME B31.3, and is CE marked by DNV.





Installation sequence

- Fits on any standard ASME flange
- Leave pipe medium in place
- Suspend the weight of the AOGV and clamp on the flange
- Transfer the compression force from the flange bolts to the AOGV & unbolt the flange using standard tools
- Plug the flange bolt holes
- Separate the pipe flanges and remove the gasket
- Insert a blind spade and compress the flanges to seal
- Perform the required work
- Release and retract the blind spade
- Insert new gasket and compress flanges to seal
- Install flange bolts and torque up flanges to reinstate the system



Frequently asked question

1. What temperature and pressure ranges can the AOGV be used for?

The temperature range is from -280 degrees to +400 degree Fahrenheit. Pressures of up to 2900psi have been achieved. Higher pressures are also feasible.

2. What sizes of pipe and pressure class combinations can the AOGV be used for?

We have been focusing on the ASME class 150 & 300 in sizes 1" to 24" but have tools that can handle sizes up to 36" and up to class 2500. The AOGV can also accommodate other flange standards such as DIN, JIS and Compact Flanges. Please see our tool fleet at Izomax.com for availability of off the shelf sizes and class combinations.

3. How much clearance does the AOGV need on either side of the flange to be able to be installed?

As a rule of thumb, for pipework from 1" to 4" the AOGV needs 2" of clearance and from 5" and upwards a 1/2 of the pipe diameter is needed, measured from the bolts and nut side of the flange.

4. How does the AOGV seal on the circumference of the flange and the bolt holes?

The flange seal is pre-energized, and seals directly from the flange circumference to the inside of the AOGV. The bolt holes are also plugged with mechanical plugs bolted to the AOGV kit. The type of seal used is dependent on the application and process inventory but typically elastomer is used to make sure uneven surfaces will be sealed properly.

5. Can the AOGV be fitted on the flange of a 3-piece ball valve?

The AOGV can be fitted on all flanged valve types and nozzles including 3-piece ball valves.

6. Does the pipework have to bear the weight of the AOGV?

For some of the smaller sized AOGV's, the pipe can easily handle the weight. However, it is normal practice to suspend the weight of the AOGV in chain hoists attached to a super-structure or scaffolding above the AOGV.

7. What about the condition of my flange face?

As part of the AOGV operation, we remove the old seal/gasket at the beginning of the operation and replace it with a new seal/gasket at the end. We have been 100% successful in restoring the flange integrity.

8. How do you perform the splitting of the flanges after the AOGV has been installed?

Either the system pressure is used for splitting the flanges or the pipe is gently moved by use of e.g., chain hoists to pull them apart. The stress tolerances are calculated for the displacements. The displacement itself is controlled by gradually releasing the compression exerted by the AOGV.

9. Can the AOGV be used on Butterfly and Gate Valves?

Yes – the AOGV is designed to be used as a positive isolation blind on any flanged pair irrespective of whether Butterfly, Ball or Gate Valves are in place.

10. Can more than 1 AOGV be installed in a system, for example on both sides of a damaged valve?

Yes, where necessary, multiple AOGVs can be installed in a system. A single AOGV can be used to set multiple blinds, but when time or technical constraints need to be considered, several AOGVs can be utilized to install blinds throughout the system.

For a detailed list of FAQ's and answers, please visit Izomax.com/aogv



Brilliant engineering is the DNA of Izomax

The Izomax value proposition is easy to see and more importantly, savings are measurable. Our portfolio of successfully completed projects covers a wide range of shapes and sizes. We regularly receive customer feedback on savings between \$2 – \$20 million USD per project as a direct result of utilizing the AOGV mechanical isolation system.

Moreover, the AOGV adds flexibility to your maintenance strategy, whilst providing certified lifetime extension for your process plant, refinery, or oil & gas installation.

