

Reliable flow control solutions
for the energy and
hydrocarbon industries



World-class valves and services

Experienced in valves

Metso's three world-leading valve product brands are renowned for their performance. For over 50 years major process industries have trusted our innovative control, on-off and ESD valves. Inherently reliable valves, in-depth application know-how and intelligent valve controllers enabling predictive maintenance give you a foundation to rely on.

Combining intelligence with reliability, Neles, Jamesbury and Mapag are valve products providing proven improvements in process performance while reducing costs. Neles and Mapag metal seat as well as Jamesbury soft seat technologies provide dependable valve performance in the oil and gas, refining, petrochemical and power industries.

Sizes range from 1/4" to 100" and they operate reliably in temperatures from cryogenic up to extremely high temperatures. Our valves improve process safety, minimize downtime and provide trouble-free operation in all energy and hydrocarbon industry applications.

Flow control services

Metso has a global network of Service Centers and Service Technicians. Competence development and the sharing of best practices globally ensure a first-rate skill-level.

Our modular service portfolio enables us to create tailor-made solutions to your real business needs. Personal commitment in resolving customer issues is an important part of the Metso service promise. Technical skills are combined with Metso global standards to deliver you first-rate service.

Flow control service solutions:

A tailored, TAG-specific preventive maintenance plan made by valve specialists, based on true valve condition and Criticality Analysis. All maintenance activities are planned (check, repair, replace) and scheduled.

Careful preplanning and a Metso Service Technician on-site to make sure that start-up goes smoothly. Accurate, TAG-specific reporting is always part of Metso service.

With our Valve Management Solution, even big direct and indirect savings are possible. Metso manages the customer's valve inventories and installed valve base. Optimum inventory is defined and excess inventory is used efficiently. Valve repairs come with standard warranty, agreed prices and delivery times.

The Start-up solution is designed to help the customer in securing the investment project by avoiding risks in valve related technical performance, budget, schedule and safety. A Metso Service Technician or a full site-team, depending on the scope, supervise the installation and start-up activities and are available for support during commissioning. TAG-specific reporting on all activities is carried out on-site and in the workshop as a part of the service, as well as kick-off and closing meetings.



Maintenance Solution

- Increased reliability
- Maintenance costs under control
- Well planned and short downtimes

Turnaround Management Solution

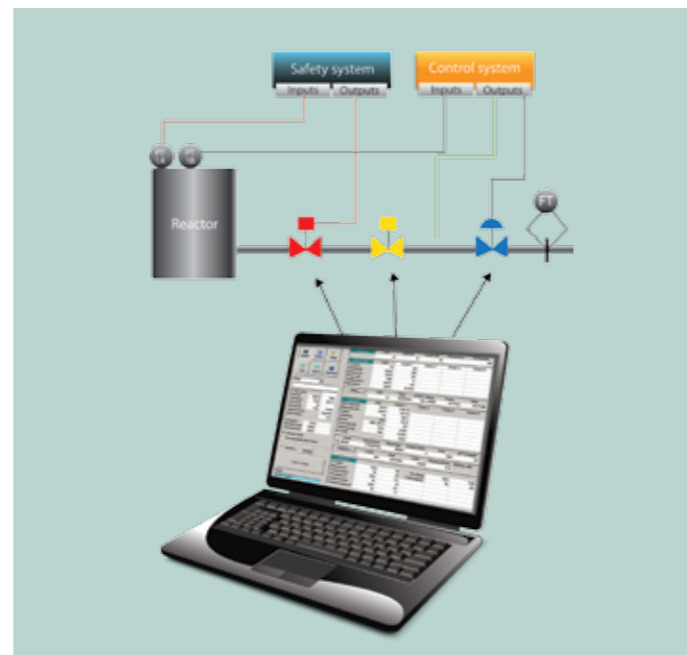
- Well planned and justified turnaround scope
- Turnaround period utilized efficiently for Maintenance Plan activities
- Availability of correct spare parts is ensured
- End user's and contractors' site teams are trained beforehand

Valve Management Solution

- Reduced inventory and purchasing costs
- Valve and inventory management
- Valve repairs with standard warranty, agreed prices and response times

Start-up solution

- Valve related risks during start-up minimized
- On-site supervision for installation, commissioning and start-up activities



- **Metso FieldCare** - Integrates all the configuration and diagnostic information. An open technology FDT based asset management tool to manage all intelligent field devices.
- **Neles SwitchGuard** - On/off valve applications
- **Neles ValvGuard** - ESD (Emergency Shut Down) valve applications
- **Neles ND9000** - Control valve applications

Intelligence with valves

Metso's intelligent valve offering is based on extensive process flow control knowhow, technological experience and tools, which makes the valve selection easier than ever.

The basis of Metso's intelligent valve offering comes from rotary valve technology that creates the foundation for excellent and reliable operating performance. Metso's intelligent valve controller brings valve performance diagnostics capabilities that are on a whole new level. By incorporating Metso's application-based valve selection experience and tools to the equation, we can talk about a truly intelligent Metso valve offering.

Nelprof makes valve selection easier than ever

The right valve sizing and selection is vital for ensuring optimal performance for your application. Our Nelprof sizing and selection software enables you to select control, on/off and ESD valves quickly and accurately.

Nelprof now also for on/off valves

With Nelprof you can make optimal actuator size selections easily, including torque data. Nelprof also provides SIL calculation capabilities with all needed reports for complete ESD valves.

Neles SmartSolutions for continuous result improvement

To keep pace with your needs, Metso's technology know-how has expanded from reliable, high-quality valve solutions to a broad range of intelligent software and products called Neles SmartSolutions.

These smart products have been designed to improve the control of industrial processes. They do it by maximizing the availability of valves,

minimizing the variability of control loops, in addition to increasing and maintaining plant safety. High availability and easy interpretation are the key success factors in effective field device data analysis.

We at Metso are committed to supporting open and standardized technologies. These enable you to choose the best field devices and ensure

the availability and usability of diagnostics information independent of your control, safety or asset management system.

By integrating Neles smart products into all automation and safety systems Metso aims to boost your processes. Metso FieldCare is field device asset management software with a condition monitoring capability, which supports open and standardized FDT technology.

Metso iCV – The widest range of intelligent control valves

Metso iCV (Intelligent Control Valves) are fully suited for both general and demanding control applications. They help process plants to meet environmental regulations by control valve constructions that provide superior performance, reliability and control accuracy. The control performance of Metso iCV is a result of the frictionless, backlash-free valve and actuator construction and best in class valve position control of the Neles ND9000 intelligent valve controller. Metso's non-leakage, live-loaded valve packing effectively eliminates the need for gland packing maintenance while ND9000 enables true predictive-maintenance capabilities with its unique online diagnostics.

Metso iCV valve offering includes:

- Finetrol eccentric rotary plug valves
- V-port segment valves for high flow capacity applications
- Neles RotaryGlobe valves for applications with low flow or high pressure
- Neldisc high-performance triple eccentric disc valves for applications with a low-pressure differential or large pipe sizes
- Metso's top-entry rotary control valves for critical and severe applications



Metso's intelligent control valves provide:

- Reliability
- Control accuracy
- Low fugitive emission
- Long service life
- Predictive maintenance capabilities



Metso iESD – intelligent safety valves from a single manufacturer



Metso offers state-of-the-art intelligent safety valves with extensive experience. We have been delivering ESD valves to our customers for more than 50 years. Our products come accompanied by extensive know-how in valves, applications, safety standards and systems.

Metso can offer clear single manufacturer responsibility for complete ESD valve assemblies because all such assemblies come fully tested and configured. We can also help reduce costs with our easy valve selection and a reduced need for external accessories. We provide compact valve solutions that provide performance and help create savings.

We can offer field proven reliability data for complete valve units with accurate PFD/SIL evaluations. Neles ValvGuard's advanced diagnostics and flexible test intervals provide enhanced availability. They provide an opportunity to increase plant up time. Metso is your partner through the entire safety life cycle of your ESD valves.

Metso's iESD valve offering includes:

- Metal seated ball valves - series D and X
- Soft seated ball valves - series 7000 and 9000
- Neldisc metal seated triple eccentric disc valves - series L6
- Wafer-Sphere soft seated butterfly valves
- Mapag triple eccentric disc valves

Metso iESD valves provide:

- Reliability
- Increased safety
- Increased efficiency (up-time)
- Enhanced availability
- Compact and comprehensive solutions
- Single source responsibility





Extreme ruggedness for extreme conditions

Smooth-operating, automated process valves play an important role on offshore platforms. However, there are many differences in the working environments on offshore and onshore plants. For example, process valves on platforms are often difficult to access and the on-site delivery of spare parts is more challenging.

Traditionally, process valves on offshore platforms have been controlled by either solenoid valves or by positioners, depending on application and local decisions and procedures at the different platforms. The offshore environment also creates its own demands on the enclosures of these devices and the optimum material to be used being stainless steel.

Nowadays, intelligent safety valves and on-off valve controllers with stainless steel enclosures are also available. For example, Metso offers Neles ND9300 stainless steel controllers for control valves, Neles SwitchGuard SG9300 stainless steel on-off valve controllers and Neles ValvGuard VG9300 stainless steel safety valve controlling and partial-stroke testing devices. This allows the whole network of automated valves on platforms to be controlled by intelligent valve controllers, creating many new opportunities in areas like condition monitoring and predictive diagnostics. Intelligent valve

controllers and predictive diagnostics mean that condition monitoring and maintenance planning can also be performed remotely from onshore.

Neles ND9300 stainless steel version

Neles ND9300, with its stainless steel construction for corrosive environments, is a part of the field-proven ND9000 intelligent valve controller family. It is an ideal solution when top class performance, comprehensive diagnostics and resistance to tough environmental conditions are required. ND9300 operates on all valves and field buses and integrates smoothly into all major control systems. It helps create savings over the entire life cycle of the valve.

Optimum process performance

- Automatic tuning of control performance
- Advanced control algorithm maintains valve performance in changing conditions

Neles ValvGuard™ VG9300 stainless steel version

Neles ValvGuard™ VG9300 stainless steel version is the latest addition to Metso's successful range of valve controllers. Providing increased safety in the most cost-effective way, the new safety valve controller and

partial stroke test device for emergency shutdown valves is available both for HART and FOUNDATION fieldbus environments.

Increased safety with Neles ValvGuard

- Extensive safety valve testing capabilities
- Reduced risk of material buildup on valve surface during plant uptime due to varying the PST stroke size within set limits.
- Leading large pneumatics capacity eliminates external instrumentation components

Neles SwitchGuard™ SG9300 stainless steel version

Neles SwitchGuard™ SG9300 stainless steel version is Metso's new intelligent controller for pneumatic on/off valves. Its innovative diagnostics features enable you to predict failures in process-critical on/off applications and check the valve condition remotely. With this unprecedented visibility of on/off performance, you can practice predictive maintenance and planning before any problems affect the process.

Designed for switching applications

- Speed control with different opening and closing profiles
- Exact valve opening and closing times
- Minimized pressure impact on piping, a.k.a. water hammering effect
- High pneumatics capacity



iCV success case:

No more problems with heater-pass applications

Some of the refineries of Petrobras, a leading oil company in Brazil, had major heater-pass valve problems, which led to unscheduled shutdowns and frequent maintenance. After testing several valve options, Petrobras REVAP replaced the valves used to control the heater passes with Metso's reliable Neles Finetrol eccentric rotary plug-type valves.

In addition to eliminated incidences of jammed valves, there has been no need for unscheduled maintenance or unscheduled shutdowns since. The more stable and accurate operation has enhanced quality and productivity. Environmental problems previously associated with the heater have also been eliminated.

Petrobras has accepted Neles Finetrol as the preferred answer to its heater pass flow control problems when handling high-viscosity, high-temperature oil products. It is now recommended to sites with similar process conditions throughout Brazil and elsewhere in South America.

Ensured success – customer cases

iESD success case:

Metso's new intelligent valve technology for Shell Eastern Petrochemicals' Houdini project

Metso's contribution to the project includes over 1300 valve assemblies with new technology. All pneumatically operated on/off valves in the project are equipped with Neles ValvGuard VG9000 intelligent safety valve controllers, as mandatory, instead of conventional solenoid valves and limit switches. This new technology-based pneumatically operated on/off valve set-up was applied for the first time on such a scale anywhere in the world. Mr. Peter Beerepoot (Shell ECC Project, Manager Process Automation Group and Instrumentation) is very satisfied with the decision to use ValvGuard throughout the Houdini project. "Yes, there is always a risk in using a new product on such a scale, but we were convinced of the advantages the valve controller offered. Houdini was a complex project, but the end result speaks for itself. We started the plant up with no major hiccups in just 29 days, which was most satisfactory."

The new plant is set up for the FOUNDATION Fieldbus using the FDT technology. Metso's delivery scope



includes Neles ball valves, high-performance triple eccentric disc valves, V-port segment valves, eccentric rotary-plug valves and pneumatic cylinder actuators, as well as Jamesbury ball valves, butterfly valves and pneumatic actuators. Metso also included some 3rd party valve products in order to provide a "Total Project Approach" from one vendor.

Neles ValvGuard VG9F is connected to the safety system and the FOUNDATION Fieldbus DCS system for full diagnostics and configuration. VG9F intelligent safety valve controllers are also mounted on all pneumatically operated on/off valves outside the Metso range.

"Neles Finetrol valves have completely eliminated valve jamming and leaks through packing gaskets."

- Luiz Henrique, Mentzingen dos Santos, Senior Instrumentation Engineer, Petrobras REVAP





- Metso's recent refinery projects:
- Neste Oil, Finland
 - Shell Pernis, the Netherlands
 - Shell Stanlow, UK
 - Ceska Rafinerska, Czech
 - Shell Bukom, Singapore
 - Shell Berre, France
 - Rabigh, Saudi Aramco, Saudi Arabia
 - Petrobras, Brazil
 - Reliance, India

High-performance valves for oil refining

Metso provides oil refineries high-performance valves for everything from crude distillation to final products. With our valve technology, refineries are able to minimize risks related to health, safety and the environment. Plants can reach their product quality targets, as well as reduce maintenance and plant shutdown costs. We have a long and proven history of supplying valves to projects with global EPC and refining companies.

Case1: Long lasting performance for catalyst handling
 Metso's metal seated ball valves have proven themselves to be the optimal solution for UOP CCR-process. The valves have been designed for long lasting tightness and extended service life. The valve design, especially on seats, prevents particle build-up in the seat cavity and flow port areas.

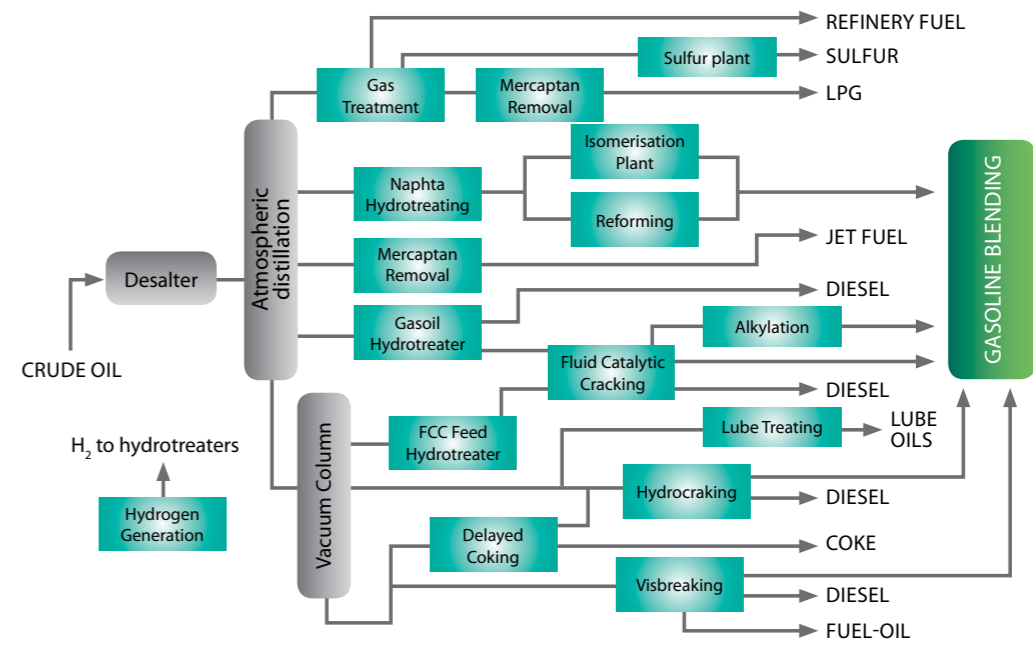
Case2: Delayed coking
 Coker service valves must be able to prevent coke accumulation and be resistant to erosion caused by coking. Metso provides reliable, fully automated two-way tight valves which eliminate packing leakages. Metso solutions ensure a process run time that exceeds 6 years.



"We've had Metso "switching valves" and isolation ball valves on the overhead vapor lines at our 4 drum delayed coker unit since March 2007 and we are immensely pleased with the product with no problems to date. I highly recommend Metso switching valves for other delayed coking units."

- Prashanth Kumar B. R. Senior Process Engineer, Coffeyville Refinery, Kansas

Metso's solutions ensure high quality, lower costs and minimized health, safety and environmental risks.





A complete offering for the petrochemical industry

Valves for steam crackers, Mono Ethylene Glycol (MEG) plants and everything in between – that’s the extent of Metso’s deliveries to the petrochemical industry. Our wide offering consists not only of control valve applications but also of emergency shutdown, blowdown and other critical automated on-off applications, as well as manual services where high reliability is a must.

Our recent valve projects for the petrochemical industry:

- Shell/CSPC, Nanhai, China
- Shell, The Netherlands
- Sasol, South Africa
- Equate, Kuwait
- Rabigh, Saudi Aramco, Saudi Arabia
- Formosa Petrochemical, Taiwan
- Copesul, Brazil
- Shell Houdini, Singapore

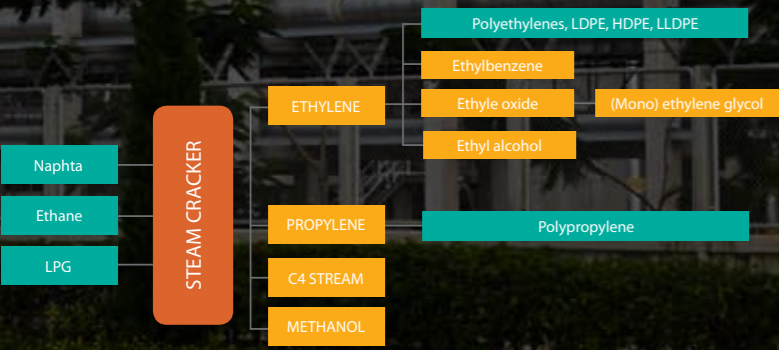
Case: Valves for a huge petrochemicals complex

CSPC Nanhai is a joint venture between Shell Nanhai BV and CNOOC Petrochemicals Investment Ltd. in Daya Bay, Huizhou, Guangdong, China.

The heart of the complex is a naphtha cracker producing 950,000 tpa of ethylene and 500,000 tpa of propylene. The total output of products is 2.3 million tpa of glycols, polyols, LDPE, HDPE, PP and MEG. The plant has one of the biggest FOUNDATION Fieldbus installations in the world.

Metso was the main supplier for control valves, automated on/off valves and ESD & depressuring valves, covering at least 80-90% of the project valve needs. The delivery included Finetrol and RE-segment valves as principal control valves, 3,000 pcs Neles rotary control valves, 1,000 pcs Jamesbury automated and manual valves, 3,500 pcs Neles ND9000 intelligent FOUNDATION Fieldbus valve controllers and 150 pcs TÜV approved Neles ValvGuard partial stroke testing systems. The plant especially appreciated the valves’ diagnostic capabilities, their ability to integrate into different DCS systems, as well as their enhanced fugitive emission control.

Metso’s strengths in handling this major project included a total project approach from quote to start-up and further, a reliable partnership and a good network of offices covering EPC project partners.



Valves for standard and demanding LNG/GTL applications

LNG

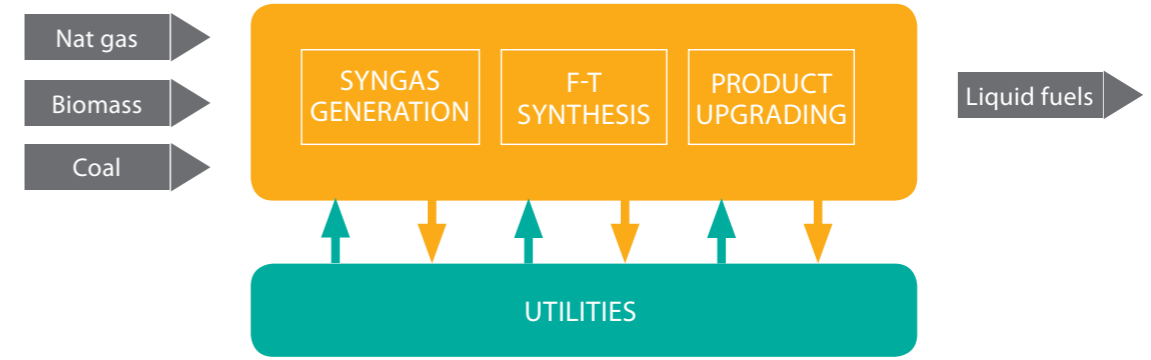
Metso valves perform reliably in cryogenic, low-temperature and ambient applications. They are used for purification, dehydration, fractionation, liquefaction, LNG tanks and loading applications. Thanks to their excellent, long-lasting seat tightness, no conditions are too severe for them. The LNG valves are tested in Metso’s cryogenic testing facility, which is one of the largest and most advanced of its kind in the world.

GTL

Valves encounter many demands in a gas-to-liquid (GTL) process, such as high temperatures, high pressure differentials and impurities. Slurry and waxy services require valve designs, which are not prone to clogging. Valve materials for oxygen valves, as well as for erosive applications, should be selected carefully.

- Our recent valve projects for LNG/GTL processes:
- Indonesia LNG
 - Malaysia LNG
 - Brunei LNG
 - Australia LNG
 - Abu Dhabi LNG
 - QatarGas LNG
 - RasGas LNG
 - Oman LNG
 - Algeria LNG
 - Nigeria LNG
 - Sakhalin LNG
 - Yemen LNG
 - Shell Bintulu GTL, Malaysia
 - Oryx Ras Laffan GTL, Qatar
 - Shell Pearl GTL, Qatar

Typical GTL process



Case: As our specification required very strict tightness and testing requirements for low temperature ESD valve service, Metso was one of only a few vendors who could provide facilities to test for full compliance with the specification requirement.

Yhenda Permana
Instrument/Electrical Group Head
PT Badak LNG





Industrial gas leaders
rely on Metso solutions:

- Air Liquide
- Air Products
- Linde
- Praxair
- UOP

A long history of valve solutions for industrial gas

Neles, Jamesbury and Mapag valves are the world leaders in reliable, high-performance industrial gas flow control solutions. Since the 1970s, Metso has been providing valves that meet the industry's most demanding challenges across the entire range of industrial gas processes; cryogenic, adsorption, and membrane technologies.

Swing adsorption solutions:

Tight shut-off at high cycles

Metso valve solutions assure valve reliability over hundreds of thousands of cycles in pressure, temperature, and vacuum swing adsorption applications.

Pressure/Vacuum Swing Adsorption (PSA/VSA) process:

With high-cycle Wafer-Sphere and B-series actuator option tight sealing over million cycles can easily be maintained. When smart technology (e.g. Neles ND9000) is utilized with high-performance valves you can have all the advanced predictive maintenance diagnostics in use that provide critical valve online condition information needed to plan facility maintenance outages.

Membrane process solutions:

Membrane processes require tight seals over the life of the system with the lowest possible downtime. In addition to valve design and manufacturing, valve selection and sizing are particularly critical.

Cryogenic solutions

Metso is uniquely equipped to help you meet the rigorous demands of cryogenic air separation. Our products and experience cover the entire process from cold box throttling valves, yard valves to cold box automated valves.

Improved performance for power production

Metso has been supplying control and on/off valve solutions, smart instrumentation, and predictive maintenance tools for both the traditional power plant designs and the rapidly growing newer technology sectors during the last decades.

The plant applications that we provide solutions for include conventional thermal power plant boilers and steam turbines, cogeneration plants, waste and bioenergy plants, circulating fluidized bed boilers and geothermal power. Challenges such as noise and cavitation control, emissions control and critical services are areas in which our expertise enables improved performance.

Typical applications

- Burner control, shutoff & ESD solutions
- Feedwater systems
- Steam generation
- Turbine ESD, induction and control

Our major power customers:

- ABB
- Alstom
- Ansaldo
- Babcock Borsig
- Kaukaan Voima
- Foster Wheeler Energy
- General Electric
- Siemens & Siemens Westinghouse

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