



Innovation Award 2025 Submission



PAC presents Oxford Flow's ES Stemless Valve: Groundbreaking Technology for Net Zero



Introduction

As the exclusive distributor of Oxford Flow in Australia and New Zealand, PAC is proud to present the **ES Stemless Valve** - a transformative innovation in valve technology that directly supports the global push toward net zero emissions. Valves are essential components in the oil, gas, and energy sectors, yet they are also responsible for up to 60% of industrial fugitive emissions, primarily due to leakage at the stem seal interface. Oxford Flow has addressed this challenge head-on by eliminating the stem entirely, creating the **world's first truly zero-emission valve**.

In addition to its emissions-free design, the ES Stemless Valve is **fully hydrogen-ready**, making it a future-proof solution for industries transitioning to hydrogen based systems as part of broader decarbonisation strategies.

The Impact of Fugitive Emissions on the Oil & Gas Industry

Fugitive emissions are unintended releases of gases such as volatile organic compounds, methane and other greenhouse gases, often occurring through leaks in valves, pumps and flanges. Valves are a particular culprit, **accounting for approximately 60% of these emissions**, primarily due to the challenges associated with sealing around a moving stem. In Queensland alone, fugitive emissions contributed 18.2 million tonnes of carbon dioxide equivalent (MtCO₂e), 14.6% of Queensland's total emissions (*2022 State of The Environment Report*).

While the oil and gas sector contributes a relatively small portion of Australia's overall emissions, it is a major source of methane, a greenhouse gas with **25 times the global warming potential of CO₂** over a 100-year period. These leaks not only hinder climate goals but also result in product loss, inefficiencies and safety risks.

The Problem: The Valve Stem

In conventional valves, the stem is necessary for actuation but introduces a critical vulnerability. Stem seals degrade over time due to wear, pressure fluctuations and thermal expansion, becoming a persistent source of fugitive emissions, even with regular maintenance.

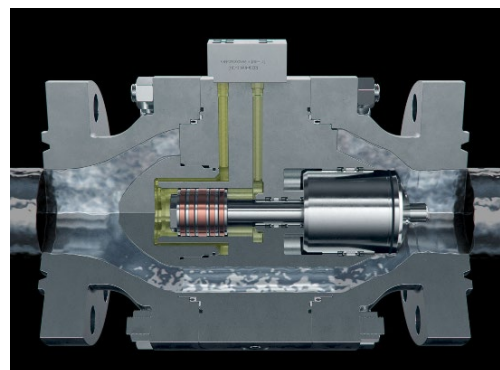
This design flaw has far-reaching environmental consequences, contributing significantly to climate change and operational inefficiencies across industrial sectors.

The Solution: The First Ever Stemless Valve

Oxford Flow's ES Stemless Valve represents a **paradigm shift** in valve engineering. By **eliminating the stem**, the valve removes the primary source of fugitive emissions, achieving **true zero-emission performance**. This innovation sets a new benchmark for sustainability and reliability in industrial valve design.

How It Works

The ES Stemless Valve uses a **direct electrohydraulic actuation system**, applying force directly to internal components without the need for a stem. This fully enclosed system eliminates all external leakage points, resulting in a **sealed, leak-proof design**.



Key Features and Benefits

- **Zero Emissions:** Eliminates the stem - the main source of valve leaks - achieving genuine zero emissions.
- **Maintenance-Free Operation:** Reduces downtime and operational costs by eliminating the need for frequent seal replacements.
- **Durability and Longevity:** Fewer moving parts and no external seals mean longer life and greater reliability.
- **Cost-Effective:** Lower total cost of ownership through reduced maintenance, emissions penalties, and operational disruptions.
- **Hydrogen-Ready:** Fully compatible with hydrogen applications, supporting the transition to low-carbon energy systems.

Scalability of Design

The ES Stemless Valve's compact, pressure-balanced design and material versatility make it highly scalable across industries:

- **Reduced Size and Weight:** Ideal for space constrained environments such as offshore platforms.
- **Remote Mounting:** Flexible installation and easier maintenance in complex systems.
- **Material Versatility:** Configurable for oil & gas, petrochemicals, hydrogen and more.
- **Emerging Energy Applications:** Suitable for hydrogen infrastructure, carbon capture and ammonia distribution.

See the Product Information Sheet attached to this submission for details on Applications, Scope and Performance & Sizing

ES STEMLESS VALVE

MODEL: ES

High performance, stemless flow valve with no mechanical actuator.
For upstream, midstream and downstream oil & gas applications.

PRODUCT OVERVIEW

The Deforum ES Series actuator-free valves offer class-leading performance and reliability for oil & gas pipelines. By eliminating the traditional mechanical actuator and stem/in-line flow of direct hydraulic actuators, the ES Series valves class-leading performance and reliability.

The ES Stemless Valve was awarded Best Mechanical Engineering Achievement Award by the American Society of Mechanical Engineers (ASME) and has also been named in the Top 100 Emerging Technologies in the ASME's Clean Technology Challenge for eliminating legacy emissions. This game-changing technology from Deforum has ES Series valves is the same in the most demanding isolation and control applications.

Designed in accordance with API 6D/ISO 318-3A Certifications.

- API 6A Flow Gate
- Fugitive Emissions ISO 15848-1 Class A/NC3
- Burst Tested to API 6A1

Headquartered and tested in compliance with International valve standards according to customer requirements, including but not limited to API, ANSI, ASME, BS, DIN, NORSOK, TROSD0 and ISO.

APPLICATIONS

Use with wellheads in Upstream and Midstream Oil & Gas infrastructures.

In place of:

- Ball Valve
- Gate Valve
- Plug Valve
- Butterfly Valve
- Diaphragm Valve
- Stem Actuated Valve

BENEFITS & FEATURES

- No mechanical actuator or stem/in-line
- Isolates internal high-pressure in function
- Isolation and control options available
- Quantitatively reduced secondary energy usage
- No moving part pre-loading valve housing
- Eliminates main source of leakage emissions
- Compact footprint
- Robust and reliable
- No in-service position installing
- Versatile full-on/off options available
- Reach on manual hydraulic overrides available

Scope

- Temperature range: -40°F to 350°F
-40°C to 175°C
- Pressure Class: ASME X500 - 9500*
Shell Class: L4.5XV (Metal Seal)

*Other pressure classes available on request.

PERFORMANCE & SIZING

ES Series	Cv	Q ₁	Q ₂
2"	133	33	85
3"	285	285	240
4"	500	500	430
6"	1025	1025	875
8"	2050	2050	1725
10"	3175	3175	2700
12"	4500	4500	3800

*Fully open, no leverage, Control Centre available on request.

Alignment with APGA's Strategic Goals

Oxford Flow is committed to developing sustainable, forward-thinking technologies that contribute to a cleaner, greener future. The ES Stemless Valve aligns with **APGA's three Strategic Pillars** by:

- Reducing emissions and environmental impact.
- Supporting innovation and technological advancement.
- Enabling the transition to low-carbon energy systems

More specifically...



MEMBERS

Create opportunities for members

- Oxford Flow have appointed PAC, Australian owned and operated, as their sole Australian/NZ distributor
- PAC's large existing network of O&G customers will have access to this innovative product



ADVOCACY

Increase appreciation of the role of gas infrastructure

- The ES Valve has been designed to meet key strategic imperatives recognised globally, demonstrating that the Oil & Gas industry can play a key role in:
- Contributing to NetZero emission targets
- Reducing operating costs due to its maintenance-free operation, and durability/longevity



CAPABILITY

Best prepare the industry for the future

- The ES design has been specifically engineered to accommodate the unique challenges of hydrogen, such as its small molecular size and potential for permeation
- This future-proof capability ensures the valve can play a critical role in hydrogen-based systems, supporting the Oil & Gas industry in efforts to decarbonise

Conclusion

The Oxford Flow ES Stemless Valve is more than an engineering innovation, it is a **strategic enabler of net zero goals**. By eliminating the stem, Oxford Flow has solved a decades-old problem, delivering a valve that is **zero emission, maintenance free and future-ready**.

PAC is proud to bring this technology to Australia and New Zealand, helping the Oil & Gas industry reduce emissions, improve efficiency and prepare for a sustainable energy future.

The Oxford Flow ES Valve – Reimagining Valve Technology!

Attachments (to submission) :

- Website references:
<https://www.pipact.com.au/>
<https://oxford-flow.com/>



- Product Information Sheet:
ES Stemless Valve



- **Case Study:**
SE Stemless Valves
High Pressure Live Gas Project



- **Product Images**



ES Valve on XXXXXXXXXXXXXXXX



ES Valve with bracket



ES Valve on Red Cedar 3