



Selecting the Right Couplings For Your Hydrogen Initiative

The hydrogen economy — a scenario in which the world adopts hydrogen as a primary energy carrier — is no longer a futuristic concept. In today's new energy landscape, the hydrogen value chain is dynamic, strengthening rapidly and already beginning to mature. Although hydrogen is a promising lever for achieving net zero goals, it also brings many engineering challenges, not the least of which is the crucial task of coupling selection.

Power transmission couplings are used on rotating equipment such as turbines, pumps, turbo compressors and beyond. In hydrogen applications, numerous factors affect coupling selection, including intermittent service (for clean hydrogen production powered by renewables), hydrogen embrittlement and high-speed compression. John Crane's hydrogen experts created this checklist to help hydrogen pioneers facilitate an easier coupling selection process.

Use the checklist below to guide your initial conversations with a couplings manufacturer. Although not all sections will apply to your application, it's critical to complete the relevant items with as many specific details as possible. In doing so, you can streamline coupling selection and set up your hydrogen initiative for maximum efficiency and reliability.

Application Type

- ☐ Centrifugal compressor
- ☐ Gas or steam turbine
- ☐ Centrifugal pump
- ☐ Electric motor
- ☐ Other rotating equipment: _____

Key Considerations: The type of equipment to which you're connecting helps determine the appropriate service factor.

Speed

- ☐ Max speed: _____
- ☐ Operational speed: _____
- ☐ Intermittent speed

Key Considerations: Hydrogen compression requires high rotational speeds due to the lightness of its gas molecules. In these applications, a high-performance (HP) coupling design is likely the right fit.

Torque

- ☐ Power (HP or kW): _____
- ☐ Operational torque: _____
- ☐ Overload torque: _____

Key Considerations: Power is used (along with the service factors associated with the Application Type above) to calculate either a metric or imperial rating. The operational torque, imperial rating or metric rating is used to select an appropriate coupling based on John Crane's coupling literature. The overload torque must be less than the maximum peak torque of the coupling.*

* Mainly for high-speed turbo applications

Weight

☐ Maximum allowable – equipment shaft bearing driver-side: _____

☐ Maximum allowable – equipment shaft bearing driven-side: _____

Key Considerations: The maximum weight the equipment shaft bearings can handle affects coupling selection.* Couplings constructed using lightweight materials such as metal alloys can reduce vibration and rotational inertia, easing acceleration and deceleration for more efficient operations and energy savings.

* Mainly for high-speed turbo applications

Shaft Information

☐ Shaft diameter: _____

☐ Straight with key

☐ Tapered with key

☐ Tapered with hydraulic fit

☐ Flanged connection

☐ Clamping shrink disc

☐ Taper lock bush

Regulatory Requirements

☐ API 671 (ISO 10441)

☐ API 610

☐ ATEX

☐ Other: _____

Key Considerations: There are no current international regulations specifically for hydrogen service. However, all John Crane's standard and high-performance couplings meet ATEX certification requirements. We also offer several coupling technologies that meet API standards.

Potential Issues/Application-Specific Considerations

☐ Thermal growth

☐ Windage

☐ High speeds

☐ Intermittent service / number of start-stops: _____

☐ Minimal available space

☐ Misalignment tolerance (angular or axial)

☐ Other: _____



Getting Started With Couplings for Hydrogen Applications

This checklist is intended as a conversation starter with your couplings designer. Although it covers many key factors in couplings selection, each hydrogen application has unique requirements — and some may not be covered within this list. At John Crane, we work with customers to select or design a coupling that maximizes efficiency, safety and sustainability based on their applications. In instances with high speeds and torques, which are often present in hydrogen applications, an HP coupling could be the right choice.

John Crane's [Metastream® power transmission couplings](#) help operators strengthen every link in the hydrogen value chain.

[Contact us](#) for coupling technologies that accelerate your energy transition with reliability and sustainability at the core.