Process Gas Compressor

Engineered equipment for Direct Reduced Iron (DRI) production



Reliable, high performance compression for varied and complex gas compositions

Key benefits

- Operates reliably across varying gas compositions and duty points
- Withstands hazardous and corrosive gases
- Handles large volume flows efficiently
- Compact and cost effective integrally geared design
- Technology proven within demanding and critical gas applications

Howden, a Chart Industries company, designs centrifugal process gas compressors specifically engineered to meet the demanding operating conditions of DRI steelmaking.

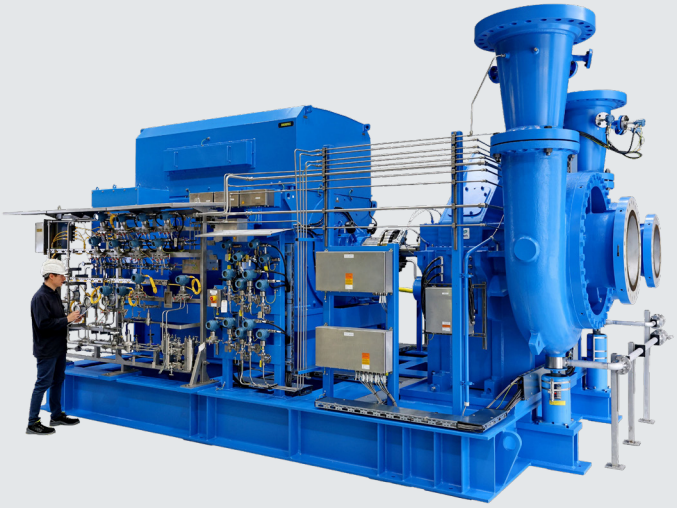
Leveraging decades of experience in compressing critical gases—such as SO_2 in sulfuric acid plants and coke oven gas in coke ovens, Howden has engineered a two-stage Integrally Geared Centrifugal Compressor (IGCC), optimized for the DRI process.

The compressor is designed to accommodate a transition in gas composition from natural gas to hydrogen, ensuring stable performance across varying operating conditions.

We understand that DRI plant operators must balance controllability, cost-efficiency, and space utilization. In response, our IGCC solution delivers against these requirements while meeting the challenges of variable and critical gas compositions in explosive environments, high reliability, operational efficiency, and process safety.

The design process begins with customer-provided gas composition and duty points. Leveraging Howden's modular design principle, we rapidly configure a customized compressor solution that balances performance, cost, and lead time.

Key components are pre-defined within our modular framework. We select compatible geometries and perform fine-tuning and trimming between the impellers and compression casings to ensure optimal integration. This approach enables us to deliver a seamless, stepless duty range tailored to specific application requirements.



Our process gas compressor is part of a wider solution portfolio supporting DRI steel production.



Air and gas handling equipment for applications such as main air, flue gas, cooling gas, seal gas and PTS



Solutions for hydrogen production, liquid storage and regasification.

Built for high flow rates and pressure ratios

The compressor is designed for actual volume flow rates up to 200,000 m^3/h and a mechanical design of up to 50 bar.

To accommodate this, a robust gas tight casing made of cast steel is required to handle the elevated pressures and prevent gas leakages. The unit is driven by an electric motor with variable frequency drive (VFD) control, enabling precise speed adjustment to meet different duty points.

The system requires around 11-12MW of power, reflecting the high mass flow and pressure rise.

Leak-free safe operation

A purged dry gas sealing system prevents leakages of hazardous gases - rich in CO, CH_4, and H_2 - into the atmosphere and therewith increase operational safety of the compressor.

All materials and components are selected to meet specific DRI process requirements, to ensure long equipment lifetime.

Achieving strength and efficiency

Heavy-duty, open impellers with 3D-blading are essential for achieving the highest isentropic efficiency across the whole range of flow rates and gas compositions.

The open impeller design has proven suitability for handling gases prone to buildup and clogging and inherently offers a self-cleaning effect, enhancing reliability and reducing maintenance requirements.

Further, this robust design ensures sufficient material thickness to withstand erosion over time, thereby extending the operational lifespan of the equipment.

High performance materials

The process gas contains iron ore fines, which introduces a significant risk of abrasion and erosion. Additionally, the gas is wet and chemically aggressive, necessitating special alloy materials and design features that can withstand both corrosion and stress corrosion cracking.

Corrosion and embrittlement resistance are ensured using high-grade alloys:

- Inconel 718 for high strength and corrosion resistance in the first stage.
- 17-4PH stainless steel for durability in the second stage, especially against particulate-laden gas without compromising system performance.

Project example: New Build DRI Plant

A steel producer sought to increase their sustainablility through supply control and CO_2 emission reduction. They turned to DRI technology to supply their Electric Arc Furnace with reduced iron.

The new plant required a process compressor that could handle natural gas, while remaining flexible for a future transition to hydrogen.

Cost effectiveness with compact footprint and single motor drive were also key aspects.

The Howden compressor achieves the gas composition flexibility due to its material selection and design. The dual-stage configuration delivers high performance in a single unit, limiting required space and lowering capital and operational costs.

For further information contact our team today:

metals@chartindustries.com

www.chartindustries.com/metals

CHART® Cooler By Design®

Howden A Chart Industries Company

©Howden Group Limited. All rights reserved. 2026.