HYPER/SECONDARY COMPRESSOR COMPONENTS
HIGHEST AVAILABILITY OF YOUR EQUIPMENT

Compressors for a Lifetime®
TRUSTED SOLUTIONS
FROM THE LEADER IN HYPER TECHNOLOGY

BURCKHARDT COMPRESSION

Burckhardt Compression is the recognized market leader in Hyper Compressors and the only manufacturer that offers the complete range of reciprocating compressor technologies, Process Gas Compressors API 618, Hyper Compressors, Laby® Labyrinth Piston Compressors and Standard High Pressure Compressors.

As the pioneer in Hyper Compressor technology since 1951, our long standing know-how and unrivalled expertise are the basis for innovative solutions for any Hyper/Secondary Compressor.

LEADING HYPER COMPRESSOR TECHNOLOGY

With our proven track record and experience we provide best in class component and service solutions. We are able to support you at every stage of the Hyper Compressor’s lifecycle, including:
- Requirements evaluation
- Situation analysis
- Consulting services
- Engineering services
- Capacity change/modernization
- Service friendly parts design
- In-house manufacturing of high pressure parts
- Professional installation
- Skilled start-up assistance and adjustment for perfect running conditions

MAXIMIZE YOUR PLANT AVAILABILITY

All our activities are aimed to maximize your plant availability. Our close cooperation with customers and Hyper specialists allows us to satisfy market requirements in the constant quest for sustainable solutions. Our dedication to Hyper Compressor technology and our focus on evolving market needs are what motivate us to organize the highly regarded Burckhardt Compression LDPE Symposium on a regular basis. The exchange of information and ideas with internationally renowned experts inspires us to continuously improve our solutions to meet the requirements of compressor users.

Our dedicated Hyper Compressor specialists are the experts when it comes to comprehensive high pressure application know-how and experience. We are ready to provide full support for Hyper/Secondary Compressors as well as Booster/Primary Compressors of any brand and any type.

OUR GLOBAL SERVICE CENTER NETWORK SUPPORTS YOU IN EVERY ASPECT OF YOUR HYPER COMPRESSOR SYSTEMS LIFECYCLE.
HIGH PRESSURE PROCESS TECHNOLOGY
FOR HIGHEST SAFETY AND AVAILABILITY

SUPERIOR SOLUTIONS
FOR EVERY PROCESS TECHNOLOGY

Burckhardt Compression’s high pressure reciprocating compressors are designed to operate in autoclave, in tubular or multiple technology plants. Those plants produce a wide range of homo-polymers or Ethylene Vinyl Acetate (EVA) copolymers. Our compressor components are suitable for customers who expect outstanding performance, process flexibility and product quality. They can be built to order for any retrofit project with the objective of enhancing the product capability and reliability of compressors of all types and brands.

Ethylene and its co-products and derivatives are vital for many segments of the economy, including the production of consumer products, packaging, housing, automotive components and other durable and non-durable goods.

MARKET APPLICATIONS

LDPE is used in a wide range of products including:
- Packaging film and bags for foodstuff and sanitary articles
- Agricultural film
- Surface protection film and lamination film
- Shrink and stretch hood film
- Bags
- Bottles and tubes
- Sheet
- Healthcare applications
- Extrusion coating
- Lids, caps and closures
- Wire & cable

A PERFECT FIT
HYPER COMPONENTS AND SERVICES FOR ANY BRAND

With decades of experience and our broad in-house expertise in Hyper/Secondary Compressor components we are ideally suited to provide integrated solutions designed to maximize the safety, reliability and availability of your equipment. Comprehensive know-how and experience are crucial to design and implement perfect solutions for replacing Hyper Compressor components.

The individual components being replaced or repaired need to be perfectly matched and their interaction with other components, process parameters, the environment of the parts and auxiliary equipment must also be taken into consideration to find the optimal solution.

In close collaboration with our customers, we define the necessary scope in order to meet the requirements placed on the performance of the entire LDPE production line.

OUR OFFERING

- Repair of damaged components
- Upgrade/optimization/modification
- Retrofit/reverse engineering
- Reconditioning of worn parts
- 1:1 replacement of parts
- Replace parts of inexisten OEM

OUR IN-HOUSE EXPERTISE

- High-pressure parts manufacturing
- High-precision manufacturing
- Full quality assurance
- Tribology expertise
- Material analysis
- Lubrication technology
HYPER COMPRESSOR OVERVIEW
INTEGRATED SOLUTIONS
COMPONENTS IN DETAIL
CUSTOMIZED FOR BEST PERFORMANCE

<table>
<thead>
<tr>
<th>CRANKCASE</th>
<th>BLANKING</th>
<th>CRANKSHAFT</th>
<th>CONNECTING ROD</th>
<th>MOVING PARTS</th>
<th>CROSSHEAD TO PUMP</th>
<th>DISTANCE PIECE</th>
<th>JOURNAL CYLINDER</th>
<th>CRANKSHAFT CONNECTING ROD</th>
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<td>• High precision bearing housings, made of steel and forged from special cast iron.</td>
<td>• Use of high-quality steels in all critical points.</td>
<td>• Optimal crankshaft and crosshead pin bearings made of steel and cast iron.</td>
<td>• High performance bearings made for high pressures and temperatures.</td>
<td>• Optimal gear ratio for smooth operation.</td>
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<td>• High pressure bearings made for high pressure, temperature and corrosive media.</td>
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<td>• Separate inspection covers for easy access.</td>
<td>• Optimised material selection.</td>
<td>• Cast steel frame or welded steel.</td>
<td>• Mass for optimum vibration.</td>
<td>• Customised manufacturing process.</td>
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<td>• High precision manufacturing for optimum durability and performance.</td>
<td>• Advanced inspection and testing.</td>
<td>• Optimal weight and material usage.</td>
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REDURA® OIL SEALING SYSTEMS
ELABORATE COMBINATIONS FOR HIGHEST SEALING EFFICIENCY

REDURA® LOW PRESSURE SEALING SYSTEMS
FOR BEST PERFORMANCE

REDURA INCORPORATING THE PATENTED RAZOR BLADE™ TECHNOLOGY

The Redura Low Pressure Sealing System provides additional safety; it avoids the flow of ethylene into the distance piece. Its general design consists of an individually optimized combination of different ring types.

First the new oil wiper element LW 410 removes most of the lubricating oil and process matter coming from the high pressure cylinder side. Thanks to its superior, patented Razor Blade™ technology it provides precise and optimal oil removal and lowest surface pressure, increasing the lifetime of the ring and the plunger.

REDURA® OIL SEALING SYSTEMS
ELABORATE COMBINATIONS FOR HIGHEST SEALING EFFICIENCY

DUAL OIL SEALING SYSTEM FOR MINIMAL LEAKAGE

Separate seals on crank gear and distance piece side provide highest sealing efficiency. The tried and tested heterogeneously designed Redura Oil Sealing Systems consist of 3 main elements, each with its own specific function.

First the pre-wiper element LW 100, which prevents most of oil from ever entering the oil wiper housing. The pre-wiper element is followed by a series of rings with optimally designed edges to remove all but a fine film of oil from the elastic rod. A final sealing element seals any oil mist that may have been created within the housing. The oil sealing system of the distance piece side is equipped with an additional sealing element and a pressure ring. This prevents carry-over of ethylene into the crank case.

ADVANCED TRIBOLOGICAL IN-HOUSE RESEARCH FOR LONGEST OPERATING TIMES

Depending on the parameters, the housing and the mounting place of your Hyper Compressor, a specifically optimized solution can be designed based on your requirements. Advanced tribological in-house research provides excellent materials for longest operating times.

REDURA® LOW PRESSURE SEALING SYSTEMS
FOR BEST PERFORMANCE

The subsequent combination of Redura sealing elements depends on the process parameters and gas compositions. It consists of a selection of:

Redura RS 300 sealing elements
– Well established 3/6 piece sealing element. Radial tangential cut with bridge element, for outstanding sealing efficiency

Redura RS 900 sealing elements
– Axially pre-loaded sealing ring pair with double 3-piece sealing ring. Extremely reliable with maximum sealing efficiency for low pressure differences.

The integrated plunger seals with a self-centering design ensure that the cooling and flushing medium is kept in place. Thanks to its superior design the consumption of oil for cooling and flushing is absolutely minimized.

Tailor-made solutions backed by decades of experience in design and material selection ensure that you will receive the perfect solution for your Hyper Compressor.
The central valves have to operate with absolute reliability at the highest pressure levels, up to 3'500 bara. They must be engineered, designed, manufactured and installed with absolute precision and care.

Minuscule imperfections on parts exposed to these extreme pressure levels can lead to major damage.

Our tried-and-tested multi-poppet design results in lower poppet weight and therefore substantially lower kinetic energy. This leads to significantly longer lifetime of poppet and valve seat.

Our customized processes for best individual performance:
- FE Analysis
- In stationary fluid dynamics simulation
- Rigorous material selection
- Application of special high pressure manufacturing technologies such as: Autofrettage, shot peening or deep rolling/roller burnishing at the essential locations
- Meticulous assembly and installation executed by dedicated Hyper Compressor specialists
- Uncompromising quality assurance throughout all the process steps

Our comprehensive Hyper Compressor component know-how and experience allow us to carefully evaluate the possibilities to adapt our superior design to any other Hyper Compressor brand and type, or improve the existing single poppet design based on your requirements.
COMPONENTS RECONDITIONING AND REPAIR SERVICES
MAXIMIZE RELIABILITY AND AVAILABILITY

RECONDITIONING
To maximize reliability and availability of your Hyper Compressor equipment, well serviced Hyper Compressor components are crucial.

We provide outstanding reconditioning service for all major components of any Hyper Compressor brand and design.
- High pressure packing
- Low pressure packing
- Oil sealing system
- Central valves
- High pressure lubrication unit
- Auxiliary guide
- Plunger
- Check valves

CUSTOMIZED SERVICES
- Requirements and situation analysis
- Thorough examination
- Complete disassembly
- Inspection of individual parts
- Recording the condition of the main parts
- OEM engineering evaluation if required
- Thorough cleaning (glass bead blasting and/or ultrasonic cleaning if necessary)
- Repair and re-machining
- Lapping and grinding of all sealing surfaces
- Dimensional checking
- Replacement of worn and damaged parts with new Burckhardt Compression quality parts
- Careful reassembly
- Quality inspection including required testing
- Corrosion protection and adequate packing

COMPONENT REPAIR
Our offering also includes repair work for basically any Hyper/secondary compressor component of any type or model.

Our repair service stands for high quality and rapid turnaround in close cooperation with our customers.
- Situation analysis
- Evaluation (e.g. dye penetration etc.)
- Engineering for repair procedures
- Processes like laser cladding, nitrate hardening etc.

UPGRADES/MODERNIZATIONS
We are constantly striving to optimally support our customers regarding the requirements on LDPE plants for Hyper/Secondary Compressor systems as well as for primary compressors: we not only focus on compressor components but also on solutions supporting the entire system and our customers’ processes.

This has led us for example to the development of a cup lifter tool for fast and easy assembly and disassembly of high pressure packings. Or to innovative high pressure cylinder lubrication pipe insulation for quick installation and best insulation values and absolutely stable temperatures of the pipes and the lubricants.
SAFETY MONITORING/SUPERVISION
MINIMIZE RISK – REDUCE COST

ONLINE CONDITION MONITORING AND DIAGNOSTICS
WE RECOMMEND PROGNOST®

MONITORING THE CRUCIAL PARTS

Preventing accidental breakdowns is vital. They can have serious consequences, such as risks for plant safety and the environment, production loss, expensive consequential damages, etc.

Main measurement points for monitoring are:
- Crankshaft trigger for the crankshaft position
- Vibration acceleration on intermediate crosshead and cylinder
- Vibration velocity on crank gear
- Temperature on: plunger/crankshaft bearing/intermediate crosshead/crosshead guide plate/crosshead bearing/crankshaft journal
- Indirect measurement of the cylinder pressure by strain gauge technology
- Measurement of the plunger vibrations

INDIVIDUAL SOLUTIONS FOR YOUR REQUIREMENTS

Depending on your needs we can provide the best solution for safety monitoring and supervision including installation engineering. A combination of individual sensors and measuring systems is possible:
- Spring loaded or radar pulse sensors for cross head bearing temperature
- Proximity sensors for plunger vibrations
- Elongation measuring ring for cylinder pressure
- Resistance temperature sensors (PT100) for various measuring points

To meet most stringent requirements on safety monitoring and supervision an online system is recommended.

SAFETY MONITORING/SUPERVISION
MINIMIZE RISK – REDUCE COST

MORE THAN 25 YEARS OF EXPERIENCE

Monitoring of machines in LDPE (Low Density Polyethylene) service demands a highly adaptable and reliable technology.

PROGNOST®-NT is the leading system for monitoring Booster/Primary and Secondary Compressors in LDPE plants. PROGNOST monitors hundreds of machines in the LDPE industry at all major production companies.

Burckhardt Compression recommends PROGNOST Systems – the technological leader in safety protection and online monitoring with more than 25 years of experience.

PROGNOST®-NT is an automated machinery diagnostic system incorporating SIL 2-certified and online condition monitoring. It has been developed specifically for reciprocating machinery but is also used for different kinds of rotating equipment. It detects pending failures at an early stage and identifies the affected components. Operation-critical damages are avoided and maintenance work can be performed efficiently.

PROGNOST®-NT 
Intelligence on Duty
UNIQUE CAPABILITIES
FOR YOUR HYPER EQUIPMENT

REQUIREMENTS & SITUATION ANALYSIS
- Process Compressor condition change
- Improved design to replacement parts with excessive wear
- Damaged parts/failure
- Worn out parts
- Precarious or unsafe operating conditions
- Troublesome parts
- Maintenance and spare parts logistic scheduling

EVALUATION
- Root cause analysis/failure analysis
- Risk/Condition and Material analysis
- Feasibility studies
- Finite Element Analysis (FEA) Studies
- Non-destructive testing (NDT)
- Stock recommendations
- 3D Modelling
- Computer Fluid Dynamics (CFD) Analysis

ENGINEERING
- On-site, and/or in-house measurements of components
- Recalculation and dimensioning
- Engineering for repair procedures
- Reverse engineering/Retrofit
- Material selection and sizing
- Load optimization
- Thermodynamics

MANUFACTURING
- Highest quality assurance
- Reproduction (1:1 replacement incl. integration of latest quality standards)
- In-house precision manufacturing of parts
- Fast track production upon request
- OEM guarantee
- Specific in-house manufacturing (e.g. Autofrettage)

FIELD ACTIVITIES
- Extensive service network with our specialized field service engineers/troubleshooters
- Spare parts framework agreements
- Worldwide distribution and service center network
- Dismantling/Reassembly of parts
- Large parts stock
- Burckhardt e-Shop™ spare parts identification and ordering system

INTERACTION WITH CUSTOMER REGARDING SPECIFICATIONS AND SCOPE OF WORK
INCORPORATING FULL DOCUMENTATION OF REQUIRED GUIDELINES AND STANDARDS INCL. CERTIFICATION
UNEQUALED CAPABILITIES FOR YOUR HYPER EQUIPMENT
“WE TRUST OUR PARTNER BURCKHARDT COMPRESSION, THE LEADER IN HYPER TECHNOLOGY AND WE ARE ABSOLUTELY SATISFIED WITH THE RELIABILITY AND AVAILABILITY OF OUR EQUIPMENT AND THE SERVICE PROVIDED.”

Guan Xinchun, Plant Maintenance Manager Nanjing, BASF-YPC Company Limited
LEADING HYPER/SECONDARY COMPRESSOR TECHNOLOGY SINCE DECADES

COMPRESSOR COMPONENTS
BEST PERFORMANCE AND LONGEST LIFETIME

- Compressor valves
- Redura® rings & packings
- Capacity control systems
- Capital parts
- Labyrinth piston compressor components
- Hyper/secondary compressor components

SERVICES
THE FULL RANGE

- Burckhardt Valve Service
- Spare parts logistics
- Field service
- Technical support
- Revamps & upgrades
- Component repair
- Condition monitoring & diagnostics
- Training

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