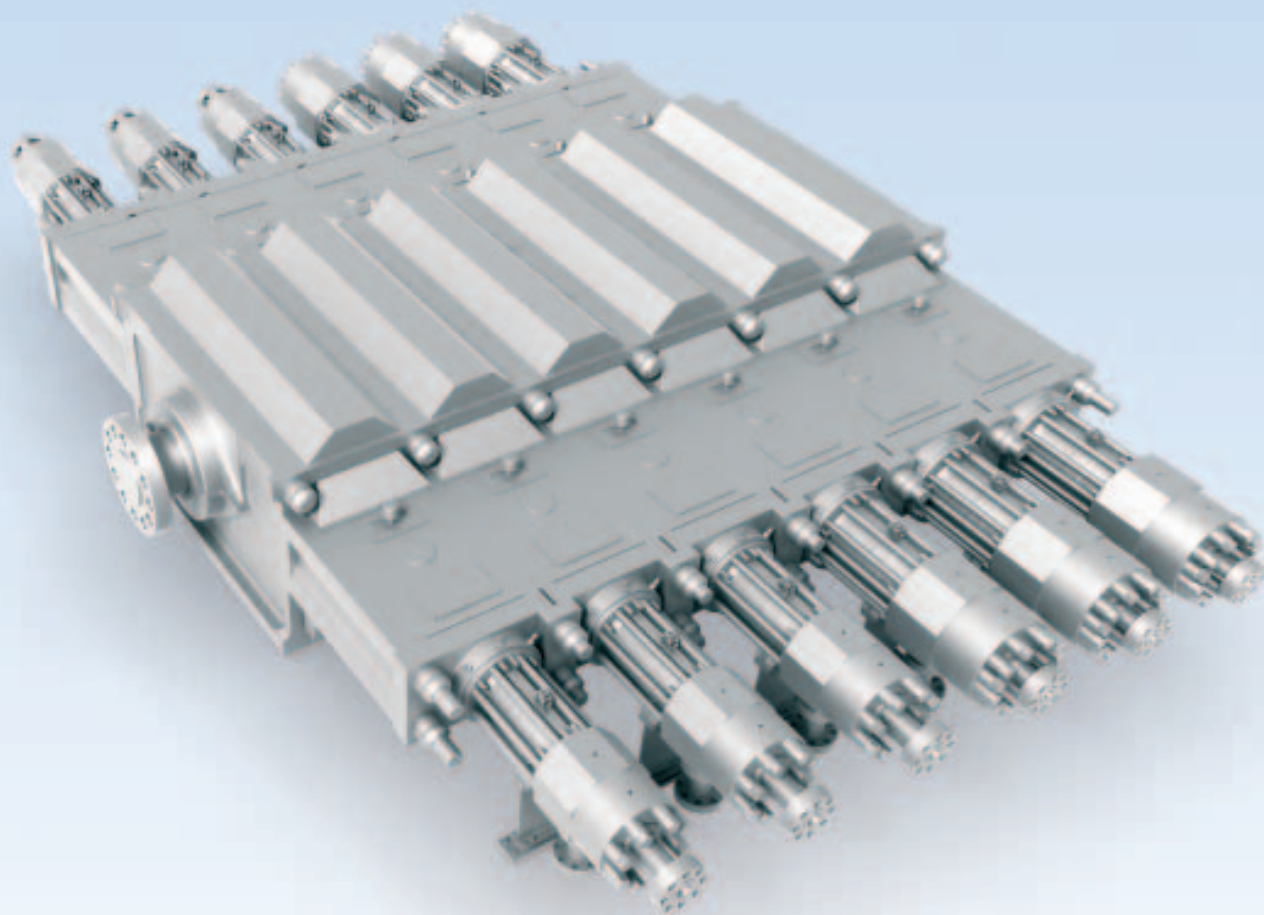


HYPER COMPRESSORS

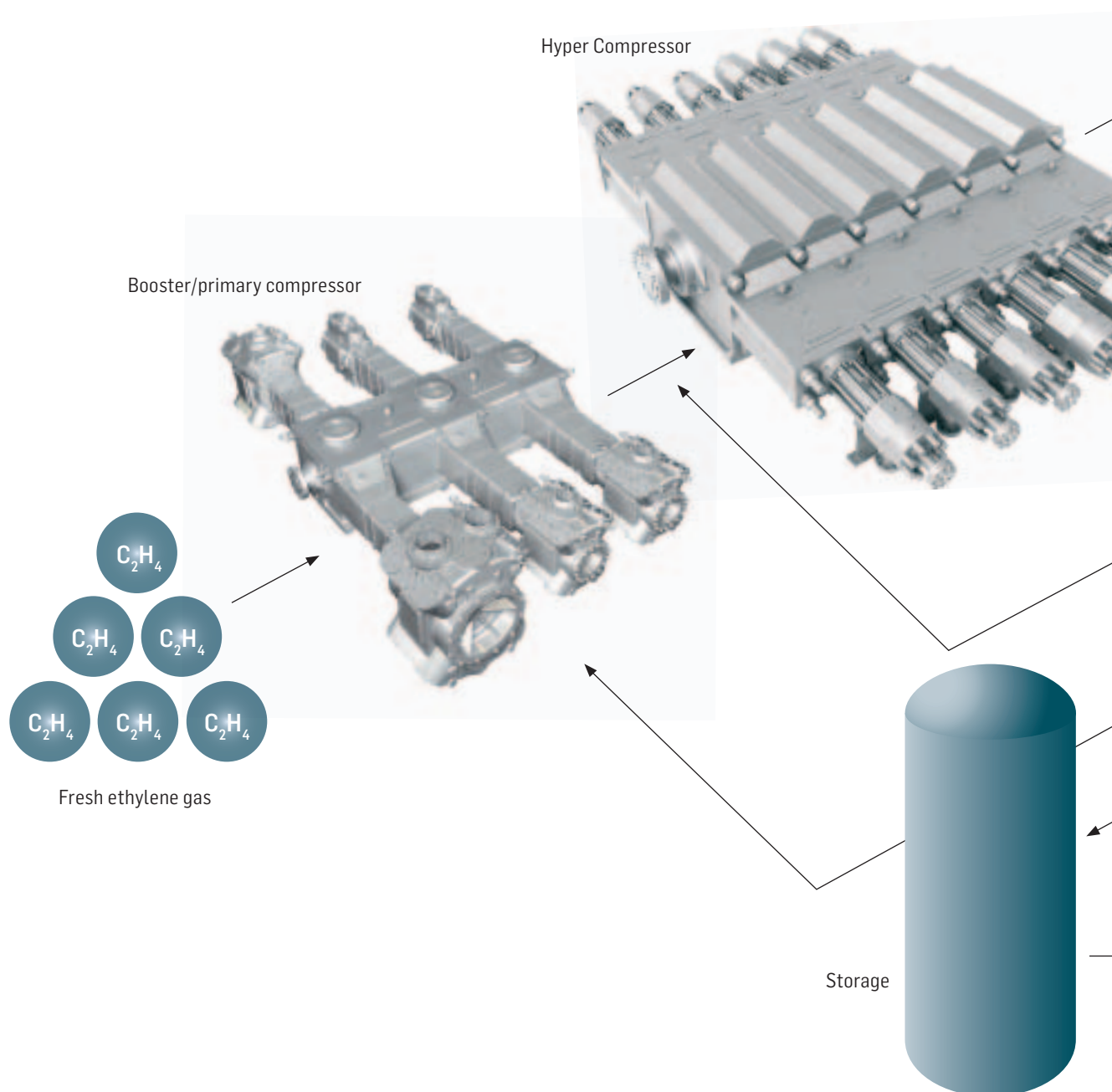
FOR LDPE PRODUCTION –
CUSTOMERS' CHOICE SINCE 1951

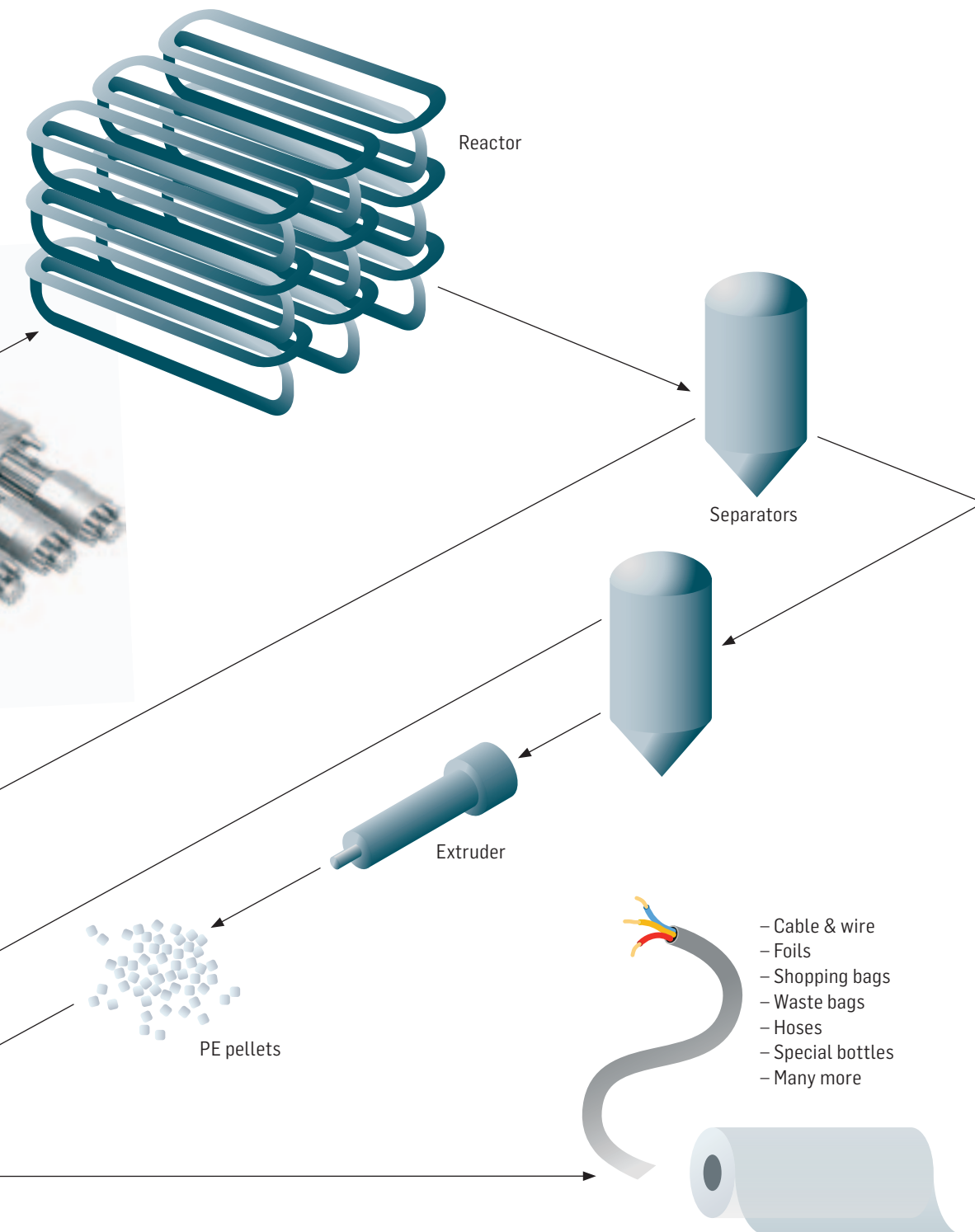


Compressors for a Lifetime™

YOUR PROCESS KNOW-HOW AND OUR TECHNICAL EXPERIENCE

A SOUND FOUNDATION FOR
A BENEFICIAL PARTNERSHIP





TECHNOLOGY AT ITS BEST

SAFETY AND RELIABILITY

KEY COMPRESSOR COMPONENTS – FOR BEST PERFORMANCE AND LONGEST LIFETIME

CENTRAL VALVES

- Combined suction/ discharge multi-poppet valve for compact design
- In full metal execution to withstand wear for long durability
- Autofrettage treated to withstand high pressures
- Optimized flow for best performance and long lifetime

HIGH-PRESSURE PACKINGS

- Applied technology based on decades of experience
- Extremely high sealing efficiency and lifetime
- Different materials and designs for various copolymer applications

LOW-PRESSURE PACKINGS

- Provides extra safety
- Avoids flow of ethylene into the distance piece

OIL SEALS

- Separate seals on crankgear and distance piece side
- Self-centering design

BEARINGS

- Large diameters for low specific load
- Expected lifetime > 15 years
- Tri-metal galvanic layers for increased wear protection

HIGH-PRESSURE PACKING CUPS

- Special design to withstand fretting
- Surface treated to avoid fissures

RUGGED DESIGN – FOR DURABILITY

INSTRUMENTATION (NOT ILLUSTRATED)

- Latest technology implemented
- For safe-guarding (protective circuits) and condition monitoring

CRANKSHAFT

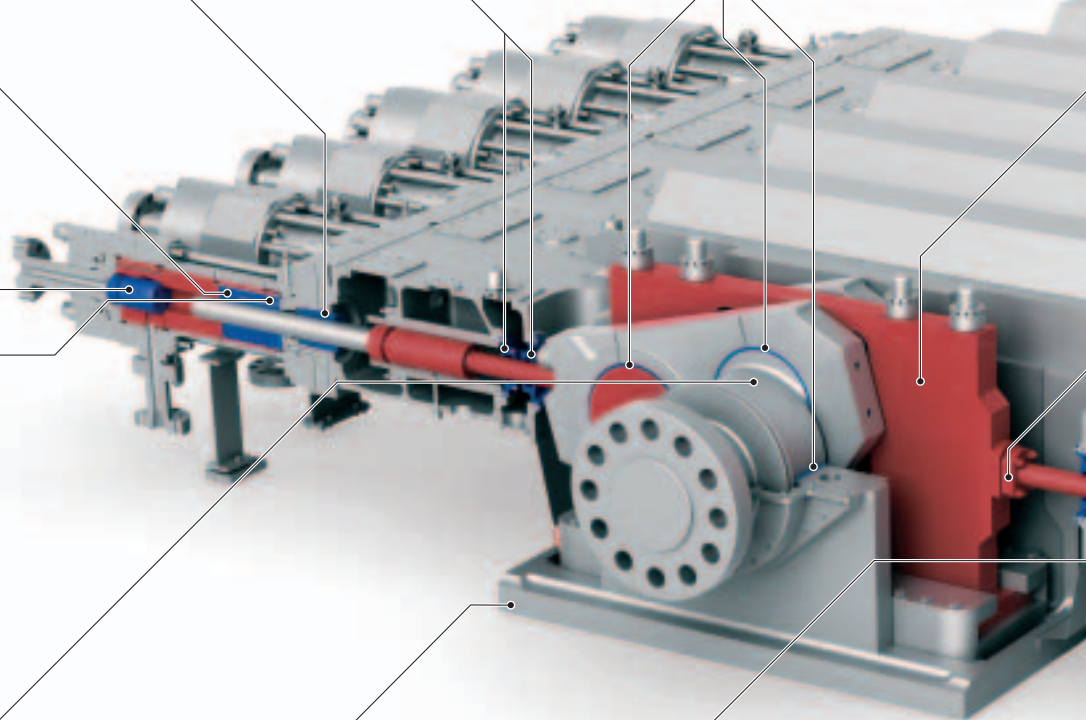
- With camshaft design
- Without webs
- Without bores
- Rigid against torsion and bending

CRANKGEAR

- Three types to minimize cylinders in operation
- Robust design with low specific loads
- Welded construction for K type
- Cast construction for H and F types
- Separate oil tank, no oil sump

LARGE CROSS SECTIONS OF COOLING/FLUSHING PIPING

- Extra safety in case of a plunger failure



IN-HOUSE DESIGNED AND MANUFACTURED MAIN PARTS – FOR RELIABILITY

CROSSHEAD FRAMES

- Bottom guidance for easy service access
- Massive construction for low vibration level

ELASTIC ROD COUPLINGS

- Low tolerance connection for excellent guidance of the auxiliary guide and plunger

AUXILIARY GUIDES

- With elastic rod
- To eliminate undesired plunger movement
- For exact plunger alignment

PLUNGER COUPLINGS

- Simple taper design to avoid tractive forces
- For less adjustment work and easy access

BURCKHARDT HYPROPACK™ – CARTRIDGE SYSTEM

- Pre-assembled module including base cup, high pressure cups, cups for the guide ring and the throttle ring, shrunk liner (cylinder) and head core (valve seat)
- For fast exchange and service

DISTANCE PIECES

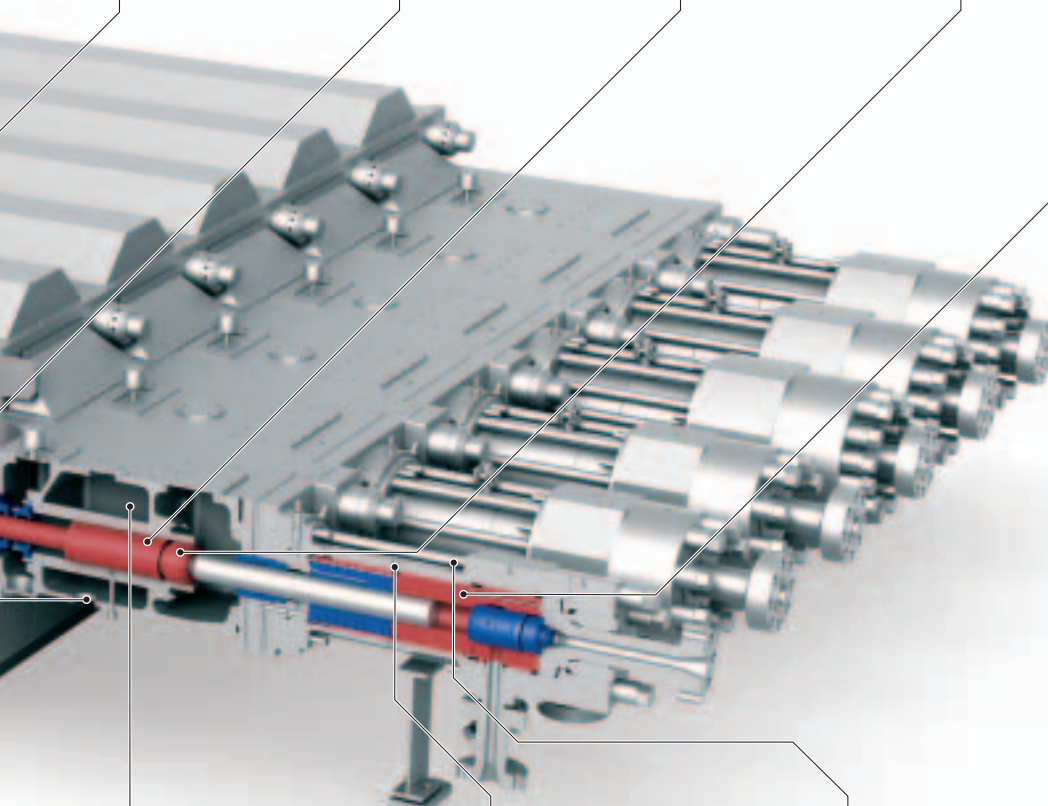
- To prevent ethylene from entering the crankgear
- For increased safety
- Double-compartment design
- No explosion relief valve required
- Vented interspace for extra safety

SAFETY DEVICES

- Rupture disk provides extra safety in case of leakage of high pressure cups

CYLINDER TIE BOLTS

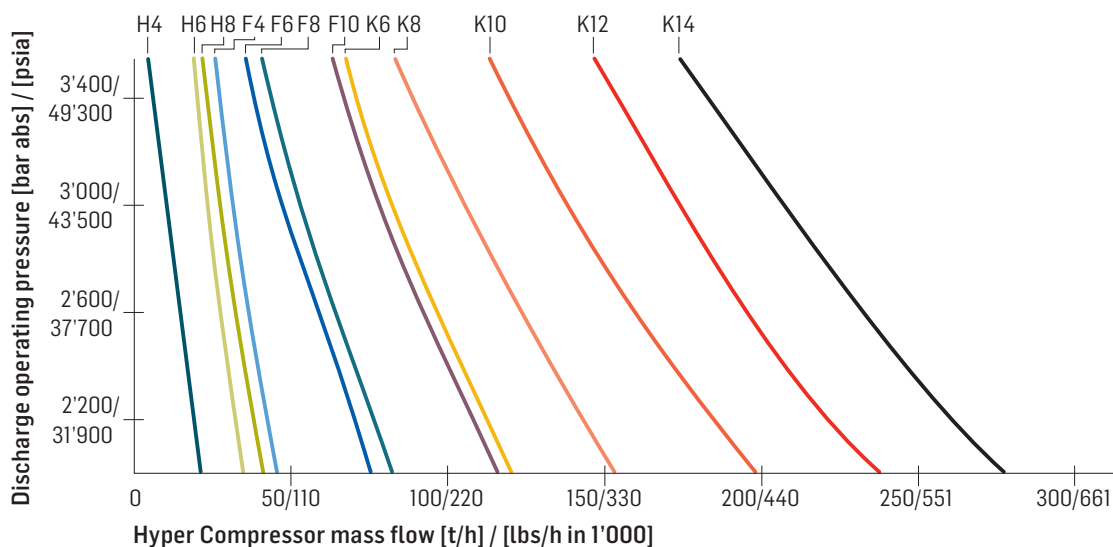
- Extra long and elastic design
- Allow safe gas decomposition



TECHNICAL DATA

PERFECT FIT FOR ALL PLANT SIZES

PERFORMANCE RANGE

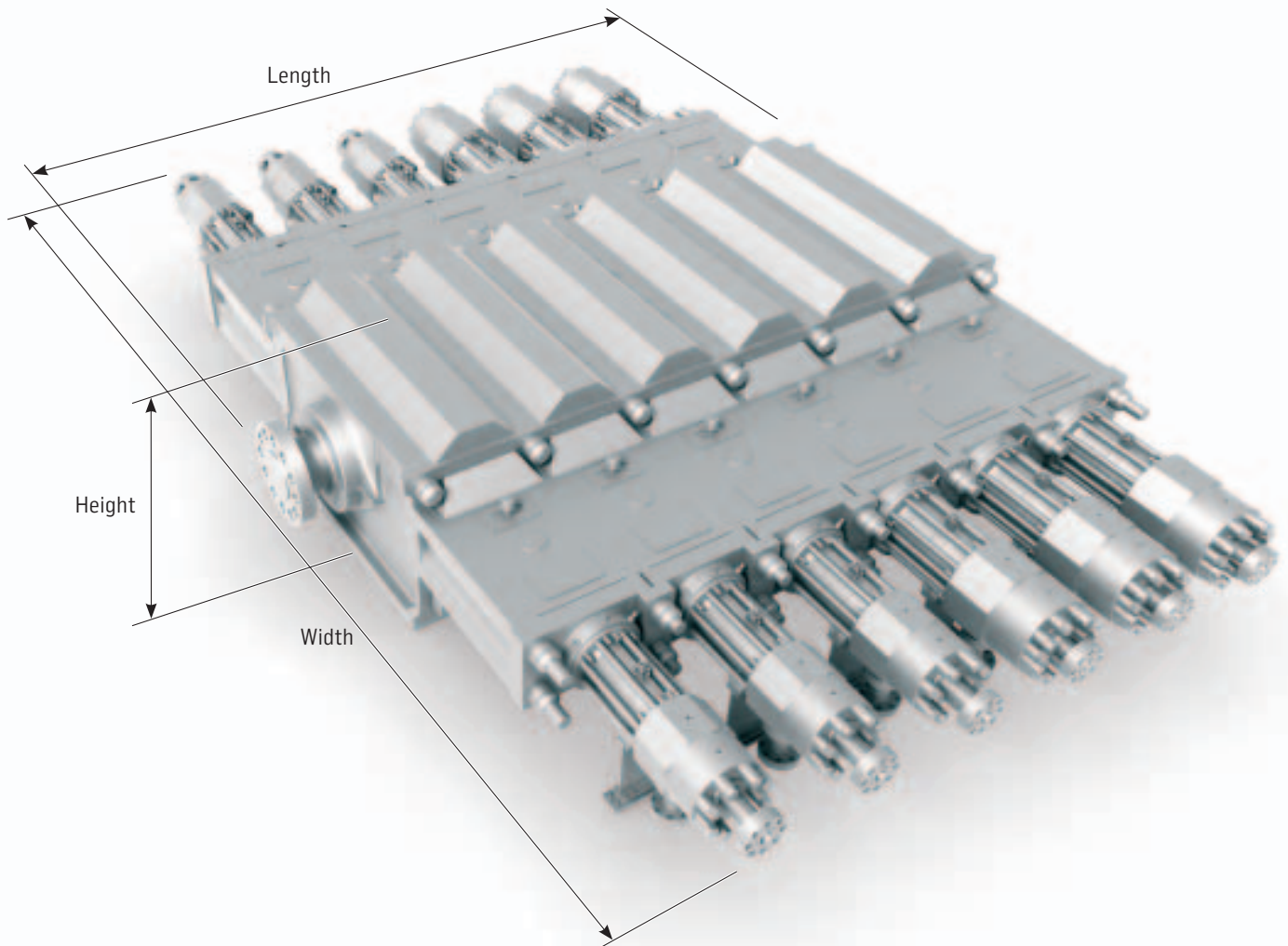


TECHNICAL DATA AND DIMENSIONS

Type	No. of Cylinders	Rated Power [kW]/[hp]	Width [mm]/[in]	Height [mm]/[in]	Length [mm]/[in]	Max. Pressure [bar abs]/[psia]	Plant Capacity [kt/a]/[lbs/a in mn] ¹⁾
H	4	4'600/6'200	8'430/332	1'590/63	2'820/111	3'500/50'760	33/73
	6	6'500/8'700			3'500/137		59/130
	8	8'000/10'700			4'180/165		66/146
F	4	8'600/11'500	9'750/384	1'950/77	3'350/132	3'500/50'760	69/152
	6	12'900/17'300			4'250/167		128/282
	8	17'000/22'800			5'150/202		137/300
	10	20'000/26'850			6'050/238		206/450
K	6	18'900/25'350	11'300/445	2'110/83	5'000/197	3'500/50'760	210/463
	8	25'200/33'800			6'100/240		226/498
	10	31'500/42'250			7'200/283		332/732
	12	35'000/46'950			8'300/327		400/882
	14	38'000/51'000			9'400/370		452/996 ²⁾

¹⁾ Reference values based on the following assumption: suction pressure 270 bar abs (3'900 psia), discharge pressure 3'100 bar abs (5'000 psia), suction temperature 40°C (104°F), pure ethylene, 200 rpm, 8'000 operating hrs/a, reactor conversion rate 31%.

²⁾ Machine configurations for larger plant capacities upon specific request.



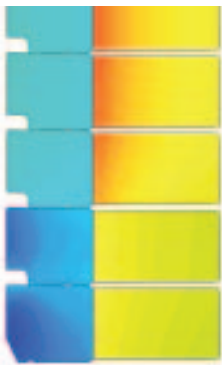
The nominal speed of Burckhardt Compression Hyper Compressors is 200 rpm in order to minimize the overall wear of the machine.

Burckhardt Compression also offers the corresponding booster/primary compressors. Our Process Gas Compressors are designed according to API 618 specifications and represent highest quality and reliability.

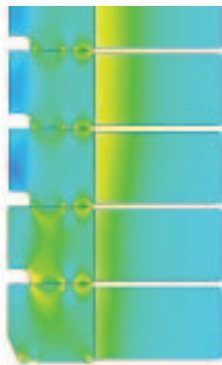
HYPER PARTS FROM YOUR OEM

BEST QUALITY FOR HIGHEST SYSTEM AVAILABILITY

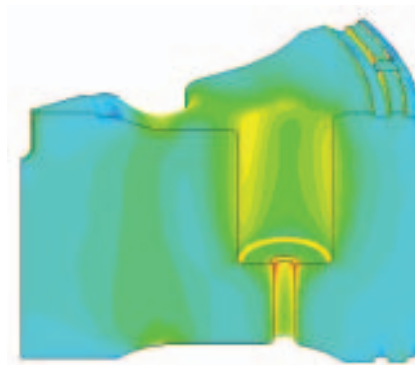
CUSTOMIZATION FROM THE HYPER COMPRESSOR MANUFACTURER



High pressure packing
radial deformation



High pressure packing
static load

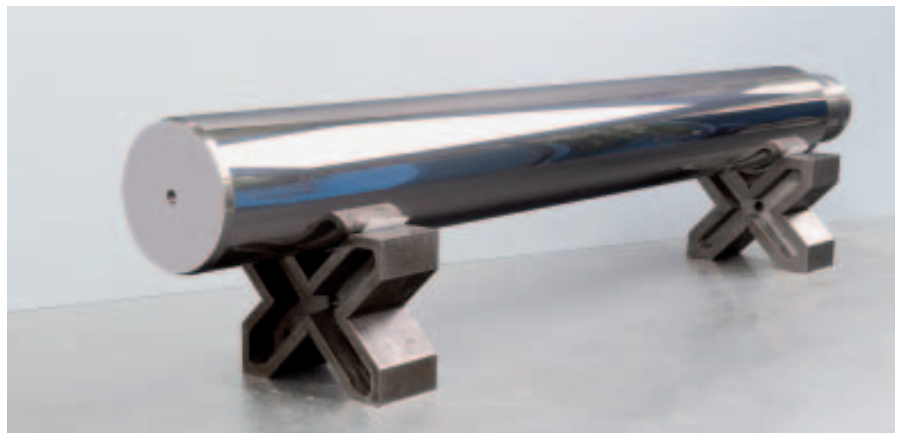


Effective stress on valve

- Hyper Compressors are taylor-made – customization is the only way to find the best individual component characteristics for your Hyper Compressor
- Pulsation and vibration studies including compressor model with integrated cylinder stretch forces and pipings with supporting structures models of the interstage heat exchangers, preheater and reactor
- Instationary fluid dynamics simulations
- Extensive research resources
- Broad experience with more than 220 realized projects with different gas compositions, processes, additives and environmental conditions

PLUNGERS

- High demands on surface finish and tolerances
- Specifications and quality assurance by Burckhardt Compression
- Design and material selection based on decades of experience
- 1st stage: tungsten carbide plated (depending on pressure and customer preference)
- 2nd stage: solid tungsten carbide (depending on pressure)
- Unique one-touch connection without alignment



Component with highest mechanical stress

HIGH-PRESSURE PACKINGS



- Applied technology based on decades of experience
- Extremely high sealing efficiency and lifetime
- Pressure breakers with advanced design and improved functionality
- Experience with special design and material selection for various copolymer applications

LOW-PRESSURE PACKINGS



- Provides extra safety
- Avoids flow of ethylene into the distance piece
- Meets environmental requirements
- Advanced tribological in-house research provides up-to-date materials for longest operating time

CENTRAL VALVES



- Customized sizing for optimized efficiency
- FEM optimized flow and multi-poppet design for best performance and long lifetime
- Autofrettage treated to withstand high pressures

HIGH-PRESSURE CYLINDER LUBRICATION PUMPS



- In-house engineered design with hundreds of references
- One pump for one lubrication point for most effective lubricant distribution
- Multiple adjustment possibilities for each lubrication situation

EASE OF MAINTENANCE

SMART FEATURES FOR SHORTEST DOWNTIME

DESIGNED FOR LOWEST MAINTENANCE



- Design with lowest number of cylinders in the market
- Resulting in minimized number of wear parts
- Low speed to reduce wear
- Advanced lubrication system for all main bearings and the entire cylinder assembly
- Easy and quick access to all wear parts

CROSSHEAD FRAME



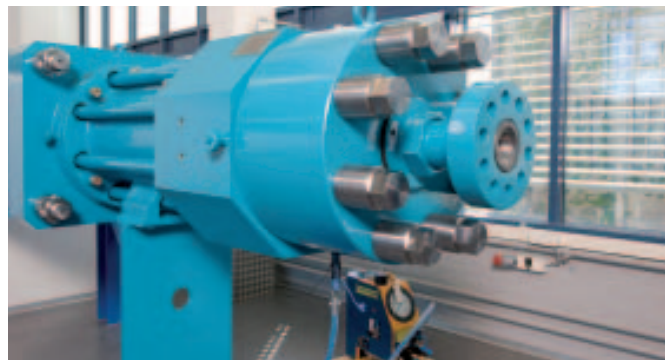
- Bottom guidance for easy access to the entire crankcase
- Easy access to crankgear, crosshead, frame, auxiliary guide, elastic rod coupling and oil seals of distance piece
- Crosshead shoes can be removed without disassembling neither the distance piece nor the cylinders

BURCKHARDT HYPROPAC™ – CARTRIDGE SYSTEM



- Pre-assembled unit including base cup, high pressure cups, cups for the guide ring and the throttle ring, shrunk liner (cylinder) and head core (valve seat)
- For fast exchange and service
- Special tools included

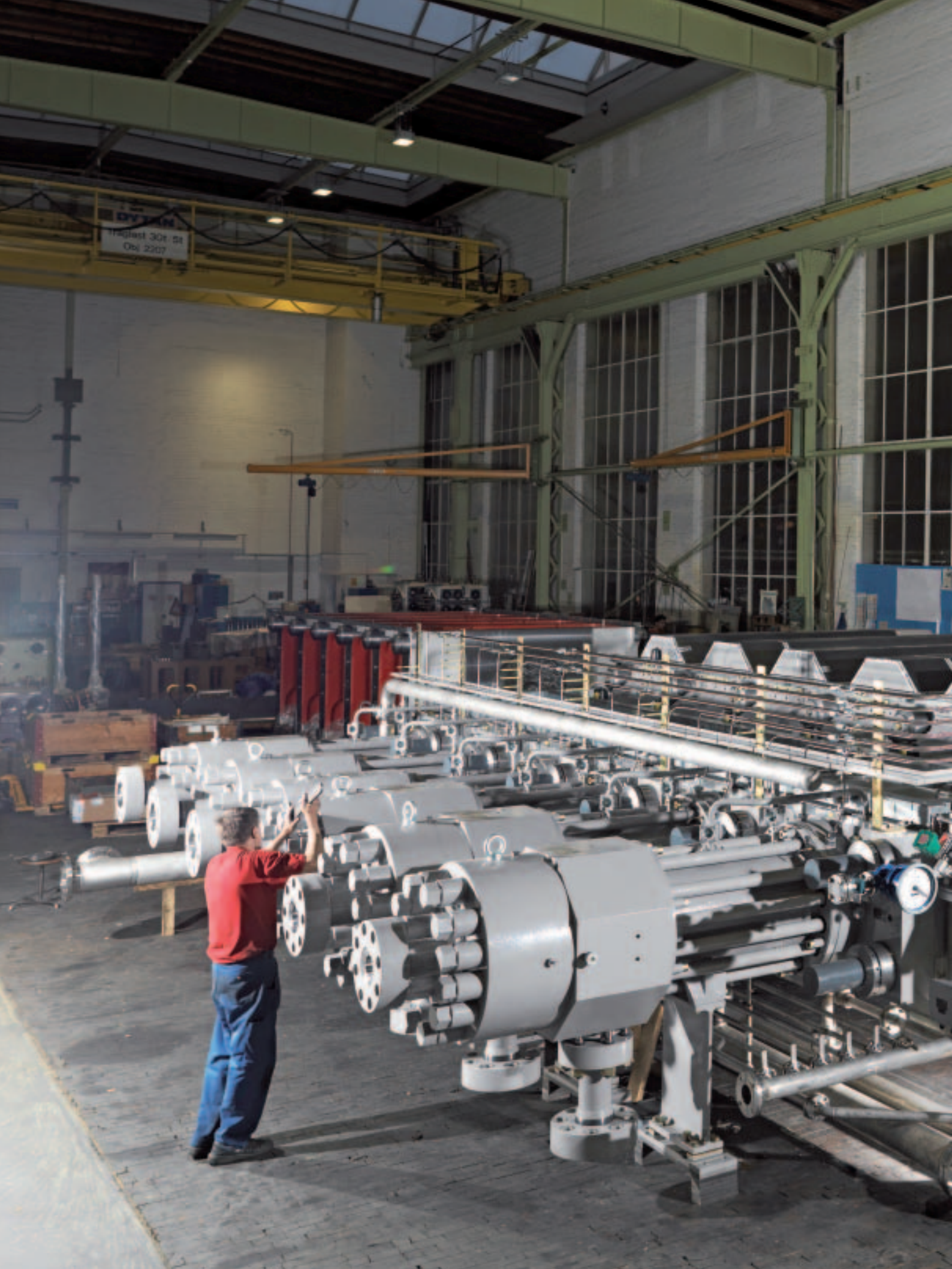
BURCKHARDT HYPROPULL™ – INTEGRATED HYDRAULIC CYLINDER



- Pre-tensioning of the center bolt
- For quick disassembly of the cylinder
- No torsional stress to the cylinder
- Scope of supply includes hydraulic pump

EASY ACCESS TO THE CRANKGEAR





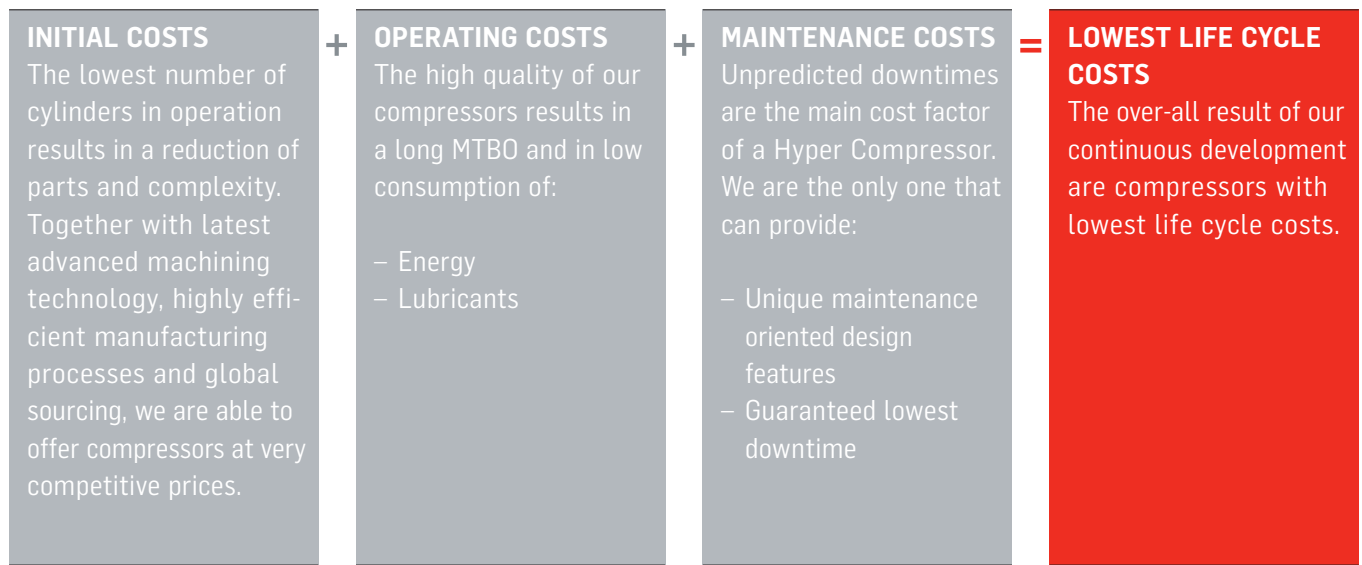


World's most powerfull single frame Hyper Compressor K12

LEADING COMPRESSOR TECHNOLOGY

FOR LOWEST LIFE CYCLE COSTS

Our Hyper Compressors are the result of the broad experience gained by Burckhardt Compression over many decades. The second to none design has been accomplished in close collaboration with our customers throughout the world. Based on their needs, Burckhardt Compression provides a robust and reliable compressor of Swiss engineering. Certified Swiss manufacturing, quality management and committed workforce ensure a constant high quality level.



Plant: Nanjing
Country: China

"Our company BYC is located in China and is a joint venture between BASF and SINOPEC. We purchased two booster/primary compressors and two Hyper Compressors from Burckhardt Compression. The compressors are in operation since May 2005. Up to now, we are satisfied with the project management and the good quality of the compressors that represent high reliability – especially a

long lifetime of the packings and valves. We appreciate the good aftersales service and the periodical visits of Burckhardt Compression. In case of any issues they provide strong and prompt technical support.

We are happy to have Burckhardt Compression as a partner."

Guan Xinchun
 Plant Maintenance Manager Nanjing
 BASF-YPC Company Limited



MANUFACTURING

WITH STATE-OF-THE-ART MACHINING TECHNOLOGY



Cutting-edge 3D CNC Measurement Machine for quality inspection



Dörries Scharmann, Heavyspeed CNC Milling Machine
Centric table load: 23'000 kg, spindle stroke: 1000 mm



Okuma MacTurn550, CNC Multitasking Center.
One of the 10 machining centers



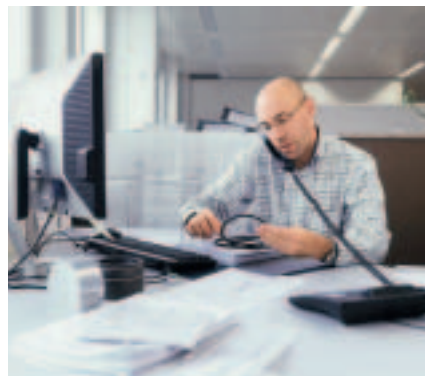
Okuma MacTurn350, Multitasking
Center. Fully automatic parts feeding



Dörries Scharmann, CNC Boring Mill
4 tables, spindle stroke: 600 mm

BURCKHARDT COMPRESSION

THE HYPER PIONEER WITH THOROUGH
IN-HOUSE EXPERTISE ...



...FROM PRE-SALES TO FIELD OPTIMIZATION BOTH FOR EPC CONTRACTORS AND PLANT OPERATORS

RESEARCH & DEVELOPMENT

Finite element analysis
Research and testing of lubricants
Mechatronics

COMPRESSOR DESIGN

Pre-sales support
Engineering analysis
Feasibility study
Selection and sizing
Pulsation and vibration studies
3D CAD
Compressor valves
Rings and packings

PLANT ENGINEERING

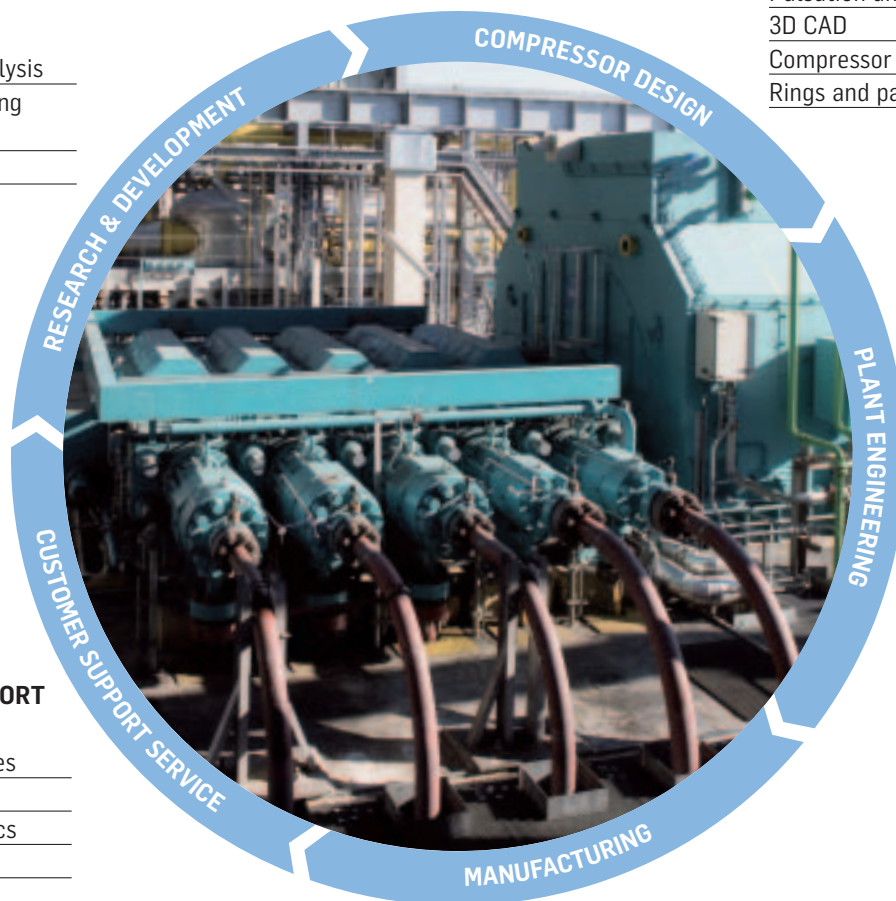
Contracting
Customer and standard specifications
Lubrication skid
Cooling water skid
Cooling/flushing skid
Instrument and control, motors
PLC programming

CUSTOMER SUPPORT SERVICE

Engineering services
Optimization
Spare parts logistics
Trouble shooting
Revamps
Field service
Valve service
Component repair
Technical support
Monitoring and diagnostics
Training

MANUFACTURING

CAM in-house machining
Purchasing
Assembly
Quality assurance



CUSTOMER SUPPORT SERVICE

THE FULL RANGE FROM YOUR HYPER SPECIALIST –
FAST, COMPETENT AND WORLDWIDE

BURCKHARDT VALVE SERVICE

FAST VALVE SERVICE WITH
EXTENSIVE GUARANTEE

- Analysis of valve condition
- Tracking of valve history
- OEM valve engineering
- Valve cleaning and overhauls
- Complete quality inspection
- State-of-the-art leak test
- Root cause analysis
- Corrosion protection

SPARE PARTS LOGISTICS

OEM GUARANTEE AND BEST
LIFE CYCLE COSTS

- Original spare parts with OEM guarantee
- Spare parts frame agreements
- Stock recommendations
- Express service for emergencies
- 12 month guarantee
- Save time and money: use the Burckhardt e-Shop™ – the easy spare parts identification and ordering system

FIELD SERVICE

ONSHORE AND OFFSHORE: BENEFIT
FROM OUR SKILLED RECIP EXPERTS

- On-site assembly and installation
- Erection/commissioning
- High safety standards – SCC and HUET certified
- Turn-key installations
- Start-up support
- Service contracts/preventive maintenance
- Plant overhaul/revision
- 12 month guarantee

TECHNICAL SUPPORT

PROFESSIONAL SUPPORT FROM
OUR WELL TRAINED AND
EXPERIENCED SPECIALISTS

- Performance analysis for optimized and efficient compressor operation
- Start-up support
- Troubleshooting
- Root cause analysis
- Emergency availability 24/7
- On-site failure analysis
- Online diagnostic support
- Consulting

COMPONENT REPAIR

SAVE MONEY AND GET
“AS NEW” GUARANTEE

- Condition analysis
- Recommendations concerning which parts can be repaired or need to be replaced
- Incorporation of the latest technology where possible
- 12 month guarantee
- Repair of components, such as high-pressure/low-pressure packings, piston rod packings, high pressure lubrication pumps, guide bearings, crosshead frames, crankshafts, elastic rods, cylinders

ENGINEERING SERVICES

SOPHISTICATED IN-HOUSE SIZING
AND ANALYSIS TOOLS

- State-of-the-art pulsation and vibration analysis
- Finite element analysis
- Unique analysis models for high pressure application up to 3'500 bar
- Reverse engineering and reengineering for own as well as for other brand compressor systems
- Dynamic analysis for any compressor parts

REVAMPS

REJUVENATE OR TUNE
YOUR COMPRESSOR

- Modernizing
- Upgrades/retrofits
- Relocation of machines
- Debottlenecking

- Operation mode studies for own as well as for other brand compressor systems
- Turn-key installations

TRAINING

HAVE YOUR OWN
COMPRESSOR SPECIALISTS

- Theoretical and practical training from our compressor experts
- Full size equipment (Laby®, Process Gas and Hyper Compressor)

- Standard trainings, customer specific programs on request

SERVICE CENTERS WORLDWIDE

- Service Center and field engineer base
- Burckhardt Compression Authorized Service Center

24 hours emergency:
+41 (0)52 262 53 53

**BURCKHARDT COMPRESSION:**

MORE THAN 220 INSTALLED HYPER
COMPRESSORS WORLDWIDE

Europe, CIS	51%
Asia/Australia	30%
Middle East	6%
North America	4%
South America	9%

HYPER COMPRESSOR TRAINING

HAVE YOUR OWN HYPER SPECIALISTS

THE BURCKHARDT COMPRESSION TRAINING CENTER

Our Training Center features the complete range of Hyper Compressor service parts and components. It is the right place to train your staff for the demanding activities of a Hyper Compressor service without the stress of getting back into LDPE production.

For more detailed information about training, please contact:

Tel: +41 (0)52 262 55 00

info@burckhardtcompression.com

www.burckhardtcompression.com/training

WHAT WE CAN OFFER YOU IN OUR TRAINING

- 1–5 days intensive training including compressor specific information
- Theoretical advice and practical training
- Full size equipment
- Qualified supervision
- Full documentation
- Training of all operations until perfect
- In a professional environment

We also offer customized trainings on-site.





MONITORING AND DIAGNOSTICS

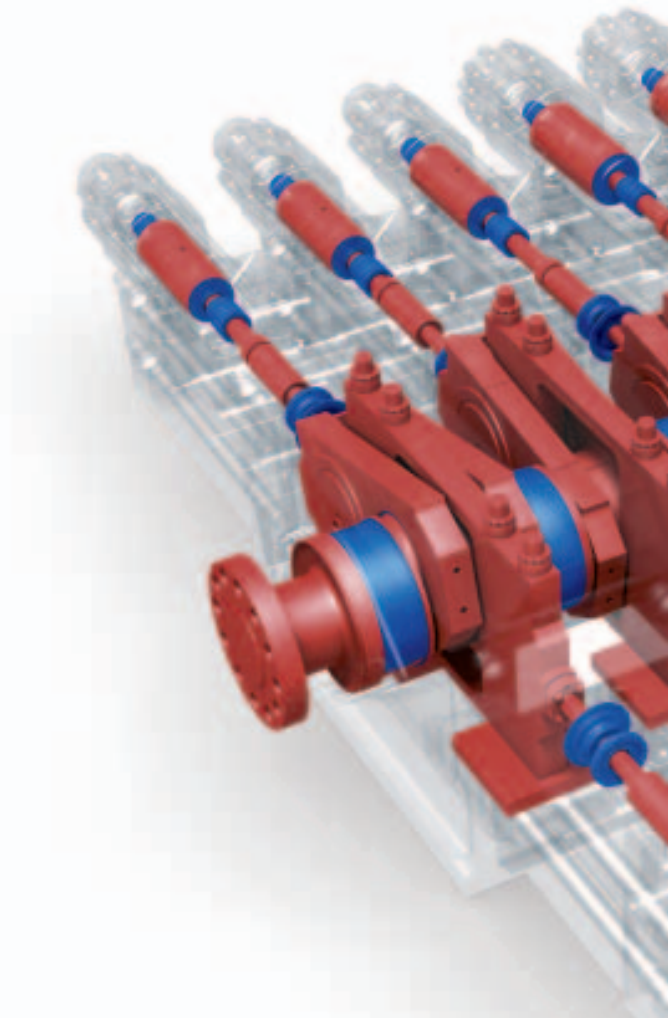
CRYSTAL CLEAR INFORMATION FOR ADVANCED OPERATION

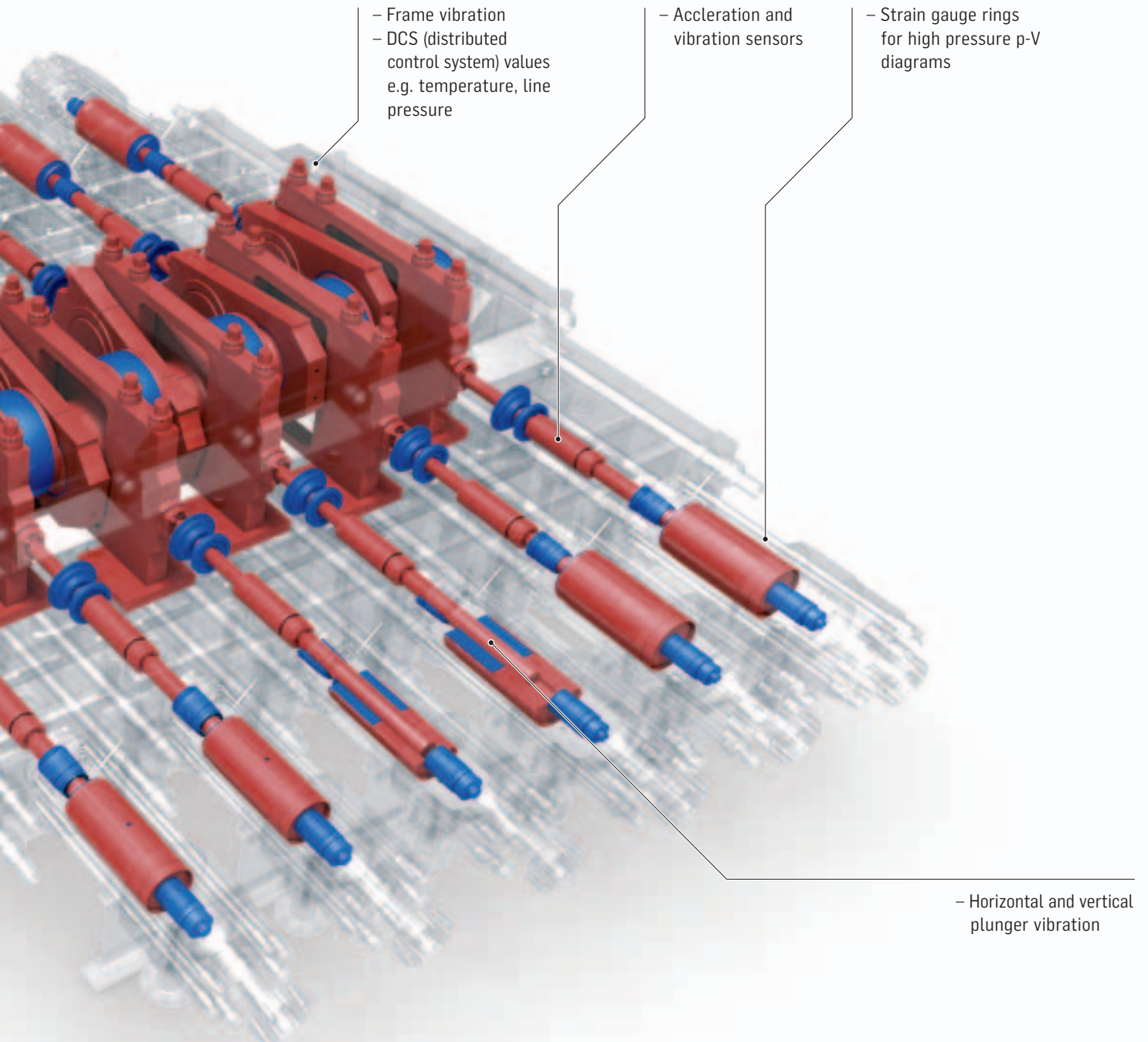
Online condition monitoring and diagnostics of compressors in LDPE service demand a highly adaptable and reliable technology. PROGNOST®-NT is the leading diagnostic system of booster/primary and secondary compressors worldwide.

It has been chosen as the No.1 OEM and retrofit solution. More than 60 compressors in LDPE service are equipped with PROGNOST®-NT today.

TECHNOLOGY HIGHLIGHTS

- Reliable and super-fast machinery protection functions using an intelligent shutdown logic.
- The Early Failure Detection module identifies mechanical defects in early stages. Clear text messages with accurate information about component damages (including location and probability) are supporting the maintenance decision.
- Continuous Wear Monitoring avoids unplanned machine stops and allows full component utilization.
- PROGNOST® Efficiency Optimization is based on dynamic p-V analyses and automatically informs about sealing problems even within Hyper Compressor cylinders.
- Integration of PROGNOST®-NT into existing DCS enables an automatic, operating condition based threshold monitoring to avoid false alarms.

**PROGNOST**www.prognost.com



RECIPROCATING COMPRESSORS

LEADING TECHNOLOGY FOR
LOWEST LIFE CYCLE COSTS

Laby® Compressors

Contactless
and oil-free



Laby®-GI Compressors

Fully balanced



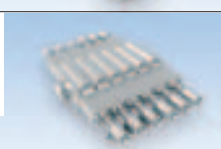
Process Gas Compressors

API 618 –
full compliant



Hyper Compressors

Safe and reliable
up to 3'500 bar



COMPRESSOR COMPONENTS

BEST PERFORMANCE
AND LONGEST LIFETIME

Valves:

- Burckhardt Poppet Valve™
- Burckhardt Plate Valve™
- Manley® valve, licensed by
Burckhardt Compression

Piston rings

Guide rings

Piston rod packings

Packing rings

Oil scrapers

Hyper/secondary
compressor parts

CUSTOMER SUPPORT SERVICE

THE FULL RANGE OF SERVICES

Burckhardt Valve Service

Spare parts logistics

Field service

Technical support

Component repair

Engineering services

Revamps

Condition monitoring
& diagnostics

Training

FOR ALL YOUR RECIPROCATING COMPRESSORS

Burckhardt Compression AG

CH-8404 Winterthur

Switzerland

Tel.: +41 (0)52 262 55 00

Fax: +41 (0)52 262 00 51

24 hours emergency Tel.: +41 (0)52 262 53 53

info@burckhardtcompression.com

www.burckhardtcompression.com

Your local contact



Compressors for a Lifetime™