



brands you trust.



Solutions for Refining



Crane ChemPharma & Energy

www.cranecpe.com

Welcome to CRANE ChemPharma & Energy

STRENGTH THROUGH INTEGRITY

This is not a new idea for CRANE. We have been committed to the highest standards of business conduct since our founding in 1855. Our founder, R.T. Crane, wrote and spoke extensively about the importance of business ethics and values, about the confidence and goodwill among employees and customers, and how this can be a competitive advantage. Today, his words continue to drive our business philosophy and serve as a benchmark by which we measure our success.

Thank you for your interest in our products. We are pleased to be able to present you with this overview of the outstanding portfolio of products and services we offer. Inside these pages you will find valves that solve your problems, provoke ideas, or raise your awareness of the broad range of valves we have available to meet a myriad of applications and service conditions.

When you look inside our products you will find more than just iron or steel. There you will find the latest technology in design, metallurgy, casting and machining all founded on our Operational Excellence principles that drive out waste and increase repeatability. In the long run, we strive for competitive products that meet or exceed your specifications, and are delivered to you on-time. Every product also contains a promise that has been built in since the very first valve CRANE made over 150 years ago. The promise allows customers to be assured of quality, engineering excellence and a legacy of performance that has been a formula of success throughout our history.

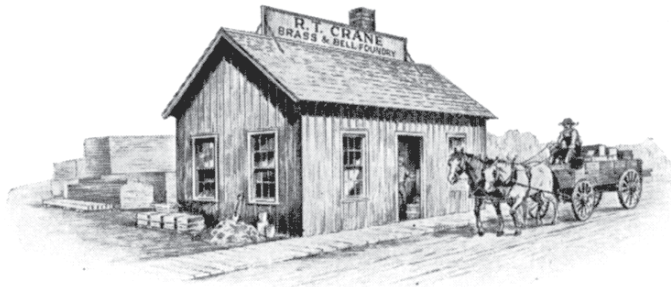
CRANE today is not only a single brand, but rather a collection of some of the best known brands in flow control history—Flowseal, Krombach, Duo-Chek, Pacific, Stockham, Center Line, Noz-Chek and Aloyco to name a few. Each of these brands have their own highly engineered product legacy and are brought together to serve the global energy infrastructure markets including Power Generation, Oil & Gas, and Petroleum Refining among others. There truly is no other portfolio like it today.

The 2,000 people who make up CRANE ChemPharma & Energy are also a big component of the products and services presented here. The people who design, manufacture, purchase, build, ship, quote, sell and support the products are dedicated to providing you with the best products at the lowest total cost of ownership. We work hard, because we know your processes demand it. From the simplest service to the most critical process in your facility, CRANE ChemPharma & Energy stands ready to deliver brands you know, technology you want and solutions you need.

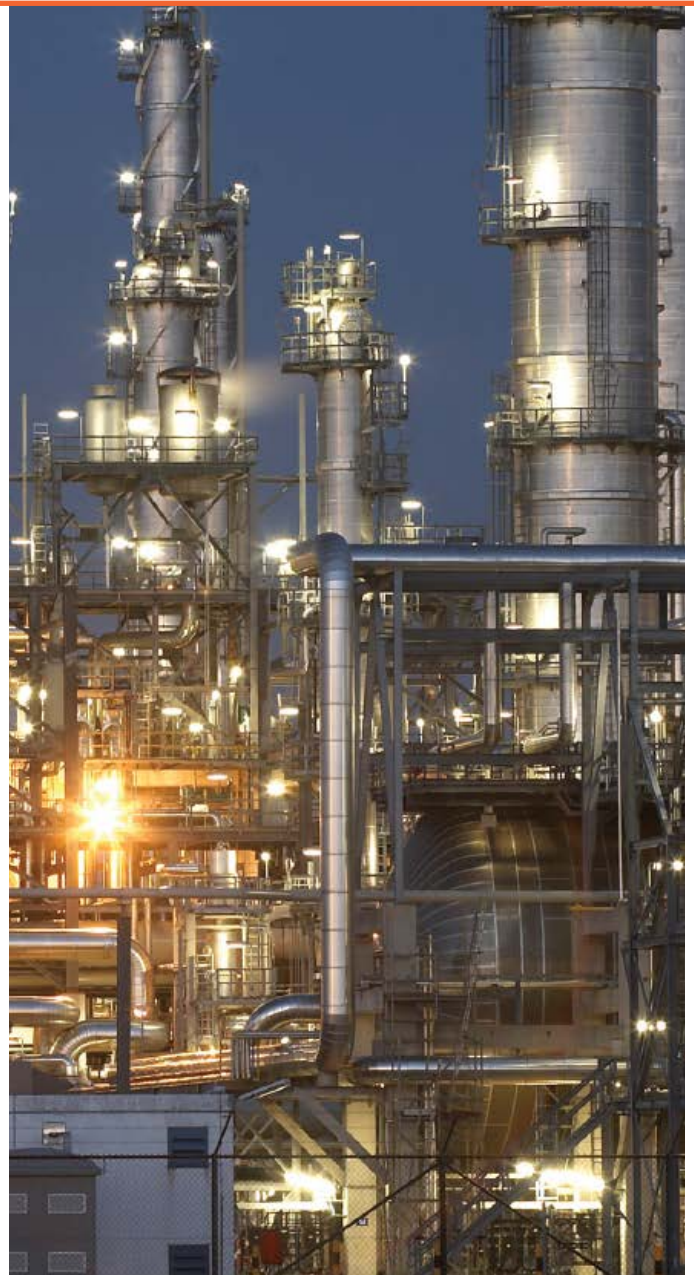
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PERFORMANCE CULTURE BASED ON TRUST AND RESPECT

To R.T. Crane, this meant being both hard headed and open minded. It's not as easy as it sounds. We question our assumptions; we listen carefully to coworkers' ideas, then add our own thoughts to see if we can build that idea into a more valuable contribution; and we trust that our suggestions will receive the same respectful treatment. At CRANE, new ideas are welcome, along with equal doses of trust and respect.



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Introduction to Crane • Crane Co.

FOUNDED IN 1855

- 1 FLUID HANDLING
- 2 AEROSPACE & ELECTRONICS
- 3 MERCHANDISING SYSTEMS AND PAYMENT TECHNOLOGIES
- 4 ENGINEERED MATERIALS

Crane Co.

Crane Co. is a diversified global manufacturer of engineered industrial products traded on the New York Stock Exchange (NYSE: CR). One of its segments, Crane Fluid Handling, provides highly engineered products for fluid handling applications worldwide.

The Fluid Handling Segment

Crane Fluid Handling provides highly-engineered products including **valves, pumps, controls and water treatment equipment for fluid handling applications worldwide**. Its operating units include Crane ChemPharma & Energy, Crane Nuclear, Crane Building Services, Crane Pumps & Systems, Crane Supply, Barksdale Control Products.

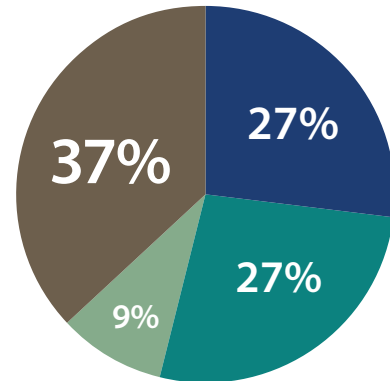
Crane ChemPharma & Energy (CPE)

Crane CP&E designs and manufactures a variety of high-performance products including: highly-engineered **check valves, sleeved plug valves, lined valves, process ball valves, high performance butterfly valves**, bellows sealed globe valves, aseptic and industrial diaphragm valves, multi/quarter-turn valves, actuation, sight glasses, lined pipe, **fitting and hoses, and air-operated diaphragm and peristaltic pumps**. Its trusted brands are in use worldwide in many industries, including **Oil & Gas, Oil Refining, Petrochemical, Power Generation, Chemical Processing, Biotechnology, and Pharmaceutical**.

Crane (CPE) Brands

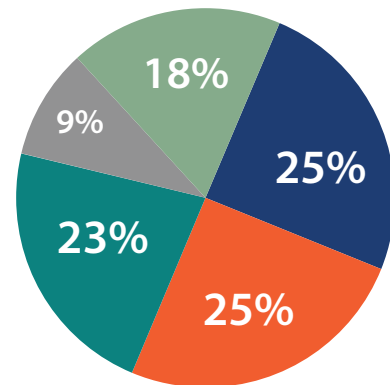
ALOYCO · CENTER LINE · COMPAC-NOZ · CRANE · DEPA DUO-CHEK · ELRO · FLOWSEAL · JENKINS · KROMBACH NOZ-CHEK · PACIFIC · RESISTOFLEX · REVO · SAUNDERS STOCKHAM · TRIANGLE · UNI-CHEK · WTA · XOMOX

Crane Co.



- Fluid Handling
- Aerospace & Electronics
- Merchandising and Payment Technologies
- Engineered Materials

Key Markets



- Chemical/Petrochemical
- Energy
- Building Services
- Municipal
- General Industry

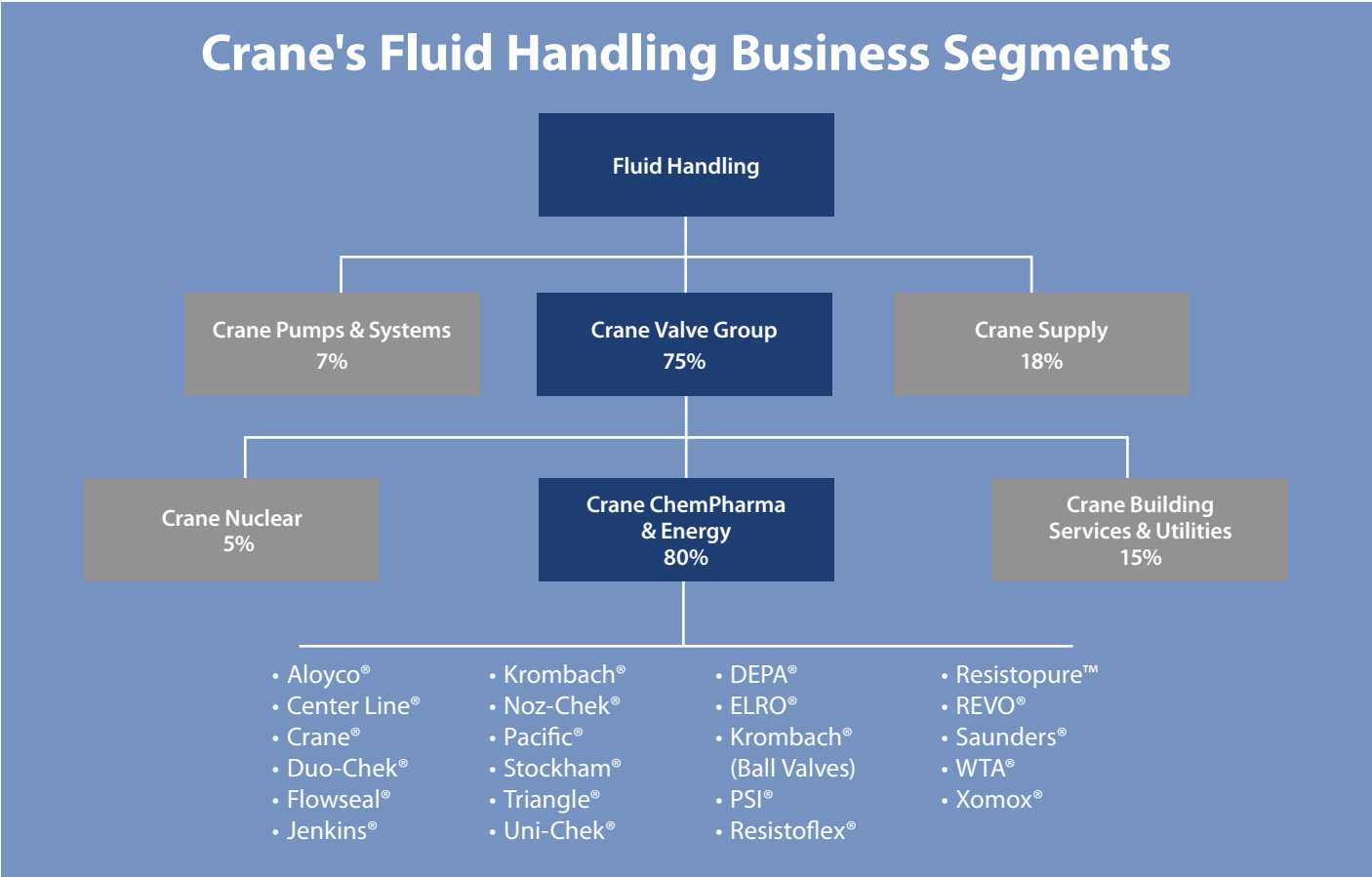
Solutions for the Refining Industry

CRANE ChemPharma & Energy: your business partner that offers trusted brands and flow solutions on a local level, worldwide.

Together, we present our customers with a strong portfolio of proven products and complete fluid handling solutions within the chemical, biotechnology, pharmaceutical, mining, oil & gas, power and refining industries. As one Crane ChemPharma & Energy Team, we offer innovative technology, financial stability, best practices, and we improve customer satisfaction by delivering a superior customer experience.



Crane ChemPharma & Energy is the global integration of trusted brands, including ALOYCO®, CENTER LINE®, COMPAC-NOZ®, CRANE®, DEPA®, DUO-CHEK®, ELRO®, FLOWSEAL®, JENKINS®, KROMBACH®, NOZ-CHEK®, PACIFIC VALVES®, RESISTOFLEX®, REVO®, SAUNDERS®, STOCKHAM®, TRIANGLE®, UNI-CHEK®, WTA®, and XOMOX®



Noteable Customers

INTEGRATED OIL COMPANIES

- BP
- CEPSA
- Chevron
- China NPC
- ConocoPhillips
- ENI Agip
- ExxonMobil
- IOCL
- Lukoil
- Maersk Oil
- Marathon
- MOL Group
- Petrobras
- PetroSA
- Reliance Industries
- Repsol
- Shell
- Sinopec
- Sonatrach
- Statoil
- Total

“PURE PLAY” REFINERS

- Flint Hills Resources
- Petroplus
- Sunoco
- Saras S.p.A.
- STIR
- Valero

NATIONAL OIL COMPANIES

- ADNOC
- EcoPetrol
- EGPC
- Kuwait Oil Co
- PDVSA
- Qatar Petroleum
- Saudi Aramco
- Sirte Oil

ENGINEERING, PROCUREMENT & CONSTRUCTION (EPCS)

- Aker Solutions
- AMEC
- Bechtel
- CB&I
- Fluor
- Foster Wheeler
- GS Engineering
- Jacobs
- JGC
- KBR
- MW Kellogg
- Petrofac
- Saipem
- SK Engineering
- Técnicas Reunidas
- Techint
- Technimont
- Technip
- UOP
- WorleyParsons

REFINERY SUPPLIERS

- Air Products
- Air Liquide

CRANE Energy Portfolio for the Refining Industry

Whether yours is a topping plant or a highly complex refinery and whether you run an Asphalt Plant, a Hydrocracker or a Coker, CRANE has the valves you need to ensure safe, reliable and cost effective operations. For over 100 years, CRANE has been designing and building high-quality, reliable valves for the refining industry. In fact, we literally wrote the book (TP-410) on understanding the flow of fluids in refining applications.

With our portfolio of well-known brands, products and services, CRANE can meet your demanding needs throughout the refinery. The following pages will highlight the wide range of our products and services as well



as the benefits each solution provides. Our portfolio is unique in both its breadth and depth.

When you buy valves for your refinery from CRANE, you get much more than just the valves. Behind each CRANE product is a highly energized

team of professionals, including Engineering, Quality Assurance, Manufacturing, Customer Service, Sales and Valve Services to name a few, who support you not only with completing the purchase, but with installation, best practices and long-term maintenance as well.

Meeting Your HSE and Capacity Utilization Goals

In refining, every piece of equipment needs to help you meet your Health, Safety and Environmental (HSE) requirements to maintain your license to operate. At CRANE Energy, we know you count on the integrity of your valves to keep your operators, your communities and your environment safe and healthy. That's why we strive to produce valves you can count on to meet these needs. Whether it is our Krombach Lethal Emissions Metal Ball Valve or our Emission Containment XOMOX Sleeved Plug and Pacific Gate, Globe & Check HF Alkylation valves or our Pacific High Integrity Shutoff Bolted

Bonnet valve, we make the products you need to meet today's high HSE standards.

Beyond meeting your HSE requirements, we know you are focused on achieving a high level of capacity utilization. To achieve this goal, however, you need equipment that you can count on not to fail. Our portfolio of products can help you achieve these utilization goals by providing consistent, reliable and repeatable service over the long term. Sometimes our customers will try a cheaper competitor to save money, but will come back to CRANE because they realize that the money saved on the valve

is quickly overcome by the money lost in an unplanned shutdown or with costly repairs and replacements. CRANE Energy continually receives customer reports of Crane portfolio valves, such as our CRANE bolted bonnet and Pacific Wedgeplug, achieving decades of reliable service.

CRANE Energy has the portfolio of valves you need to not only meet today's stringent Health, Safety and Environmental requirements, but also to achieve the highest level of reliability you demand.

Let us help you achieve your goals—contact a CRANE Energy representative today!

Quality & Certifications



The following is a partial list of certificates held by Crane ChemPharma & Energy. All certificates are available upon request.

- ISO 15848-1
- ASME 16.34, 16.10, 16.5, 16.25
- ISO 9001: 2000 (Det Norske Veritas, TÜV)
- ISO 14001:2005 (TÜV Nord)
- Zertifikat DGRL Certificate PED (TÜV Nord)
- Directive 97/56/EG
- API 6D
- QS - Certificate of Assessment PED (Det Norske Veritas)
- Technical Standards & Safety Authority
- Laboratorio De Pruebas De Equipos Y Materiales
- Welding Procedure Approval (Det Norske Veritas)
- Russian GOST R
- Water Regulation Advisory Scheme
- Design Assesment (American Bureau of Shipping)
- Konformitätserklärung ATEX - Declaration of Conformity ATEX
- DVGW - Baumuster-Prüfzertifikat Gasversorgung (DVGW Zertifizierungsstelle)
- Certificate of Recognition (Bureau Veritas)
- AD 2000-Merkblatt HP 0/TRD 201/GGVE/GGVs
- AD 2000-Merkblatt A4
- Shipbuilding approval according to MODE IBV/Mode II
- EN 729-2
- KTA 1401
- TA Luft 2000
- API 622 emissions testing
- EPA Method 21 emissions testing
- CE
- 10CFR50 Appendix B
- ASME N45.2
- ASME N-Stamp N-2 899
- ASME NPT Stamp N-2900
- ASME NCA-4000
- ASME NB Registration
- Repair and Testing of Valves and Actuators in Compliance with 10CFR.50 Appendix B and ASME NQA-1
- "NR"- Field Repair or Replacement of Class 1, 2, & 3 Line Valves and Section III Class 1, 2 and 3 Pressure Relief Devices
- "VR"- Field Repair of ASME Section I, III and VIII PRV

** These certifications are only applicable to certain products.

Refinery Flow Diagram

1. Atmospheric Distillation

Cast Steel Bolted Bonnet GGC*
 Duo-Chek Valves
 Metal Seated Ball Valves
 Triple Offset Valves
 Strainers

2. Vacuum Distillation

Cast Steel Bolted Bonnet GGC*
 Duo-Chek Valves
 Metal Seated Ball Valves
 Triple Offset Valves
 Strainers

3. Hydrotreating

Cast Steel Bolted Bonnet GGC*
 Pressure Seal GGC* Valves
 Metal Seated Ball Valves
 Triple Offset Valves
 Duo-Chek Valves
 Noz-Chek Valves
 Strainers

4. Catalytic Reforming

Cast Steel Bolted Bonnet GGC*
 Chrome Bolted Bonnet GGC*
 Wedgeplug Valves
 Metal Seated Ball Valves
 Triple Offset Valves
 Duo-Chek Valves
 Noz-Chek Valves
 Strainers

5. Fluidized Catalytic Cracking

Cast Steel Bolted Bonnet GGC*
 Duo-Chek Valves
 Wedgeplug Valves
 Metal Seated Ball Valves
 Triple Offset Valves
 Strainers

6. Alkylation

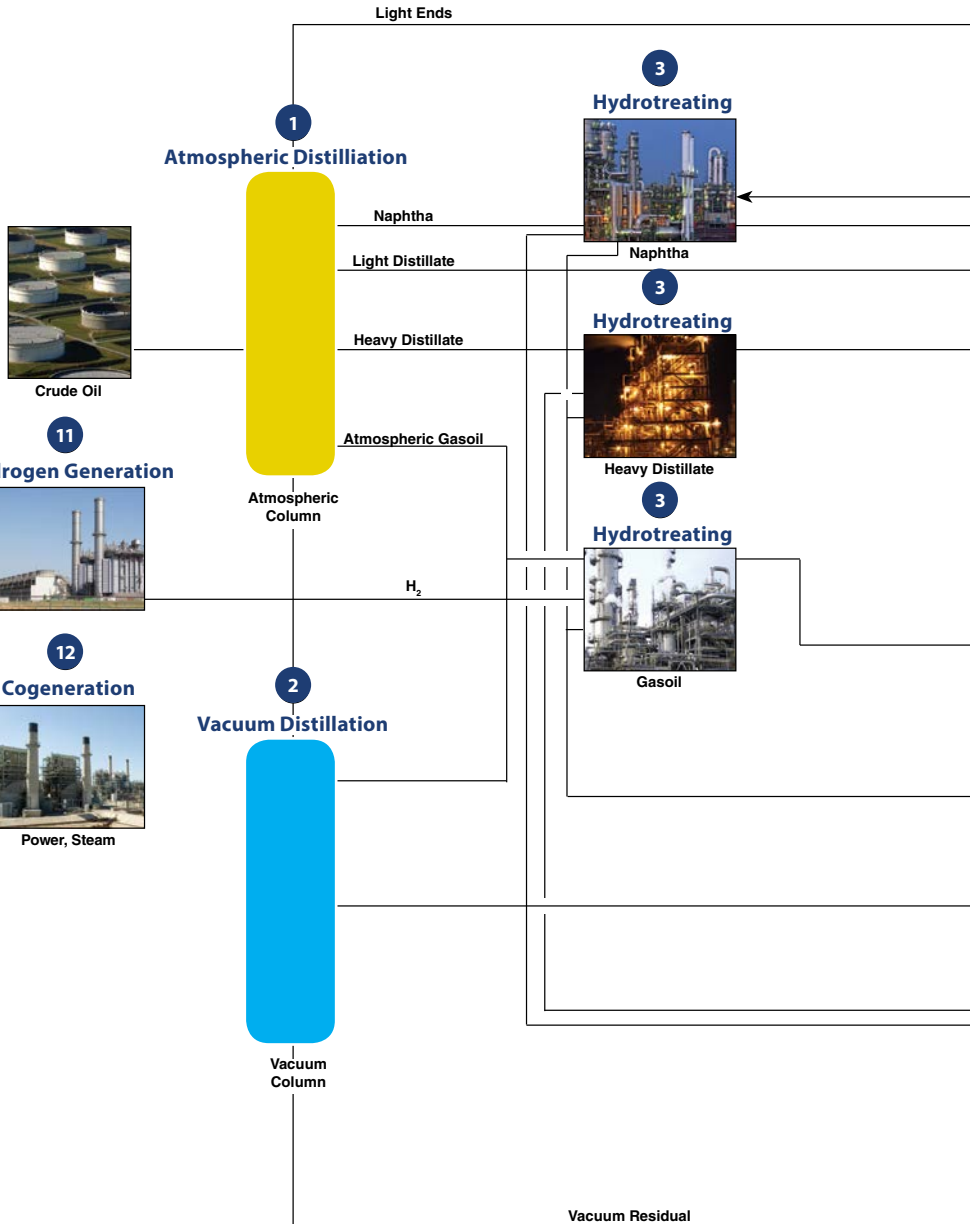
HF Specialty High Alloy Bolted Bonnet GGC*
 HF Specialty High Alloy Sleeved Plug Valves
 Sulfuric Alloyed Sleeved & Lined Plug Valves
 Sulfuric API 603 Alloy GGC* Valves
 Lined Ball & Butterfly Valves
 Line Pipes, Fittings & Accessories
 Duo-Chek Valves
 Strainers

7. Hydrocracking

Cast Steel Bolted Bonnet GGC*
 Pressure Seal GGC* Valves
 Metal Seated Ball Valves
 Triple Offset Valves
 Duo-Chek Valves
 Noz-Chek Valves
 Strainers

8. Delayed Coking

Cast Steel Bolted Bonnet GGC*
 Wedgeplug Valves
 Metal Seated Ball Valves
 Triple Offset Valves
 Duo-Chek Valves
 Noz-Chek Valves
 Strainers



*GGC = Gate, Globe & Check

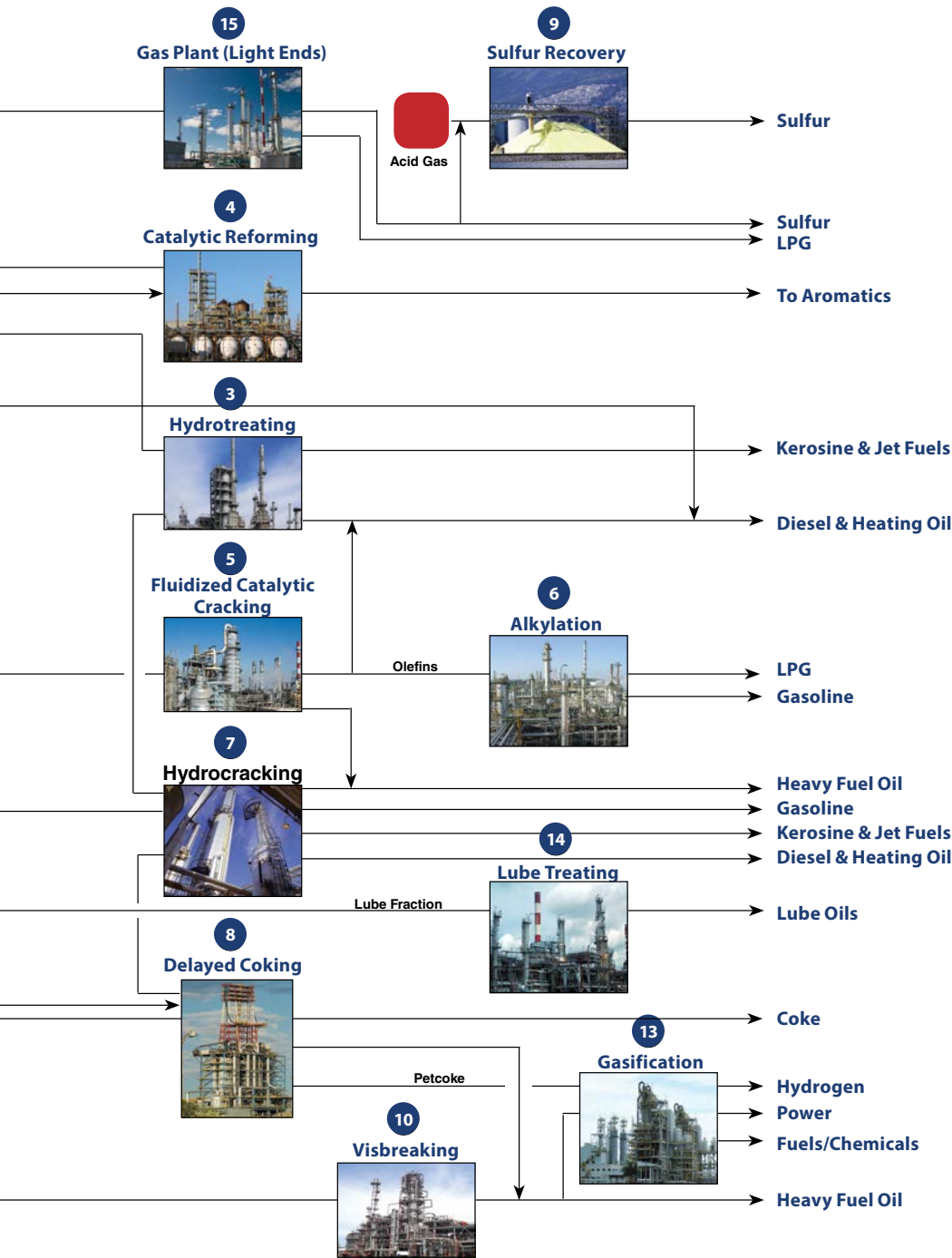
9. Sulfur Recovery

Cast Steel Bolted Bonnet GGC*
 NACE Trim Valves
 Steam Jacketed Plug Valves
 Steam Jacketed Butterfly Valves
 Triple Offset Valves
 Duo-Chek Valves

10. Visbreaking

Cast Steel Bolted Bonnet GGC*
 Wedgeplug Valves
 Metal Seated Ball Valves
 Triple Offset Valves
 Duo-Chek Valves
 Strainers

Valves by Application



13. Gasification

- Cast Steel Bolted Bonnet GGC*
- Pressure Seal GGC* Valves
- Wedgeplug Valves
- Metal Seated Ball Valves
- Fire-Safe Soft Seated Ball Valves
- Triple Offset Valves
- High Performance Butterfly Valves
- Lined Butterfly Valves
- Duo-Chek Valves
- Noz-Chek Valves
- Strainers

14. Lube Treating

- Cast Steel Bolted Bonnet GGC*
- Fire-Safe Soft Seated Ball Valves
- Triple Offset Valves
- Duo-Chek Valves
- Strainers

15. Gas Plant (Light Ends)

- Cast Steel Bolted Bonnet GGC*
- Metal Seated Ball Valves
- Fire-Safe Soft Seated Ball Valves
- Fire-Safe Sleeved Plug Valves
- Triple Offset Valves
- Duo-Chek Valves
- Strainers

Other Applications

Steam Systems

- Cast Steel Bolted Bonnet GGC*
- Pressure Seal GGC* Valves
- Fire-Safe Soft Seated Ball Valves
- Triple Offset Valves
- High Performance Butterfly Valves
- Duo-Chek Valves
- Noz-Chek Valves

Crude Oil / Product Storage

- Cast Steel Bolted Bonnet GGC*
- Fire-Safe Soft Seated Ball Valves
- Sleeved Plug Valves (double block & bleed)
- Triple Offset Valves
- High Performance Butterfly Valves
- Lined Butterfly Valves
- Butterfly Valves
- Duo-Chek Valves

Product Blending / Loading Rack Marine Dock

- Cast Steel Bolted Bonnet GGC*
- Fire-Safe Soft Seated Ball Valves
- Sleeved Plug Valves (double block & bleed)
- Triple Offset Valves
- High Performance Butterfly Valves
- Lined Butterfly Valves
- Butterfly Valves
- Duo-Chek Valves

Cooling Towers

- Cast Steel Bolted Bonnet GGC*
- Lined Butterfly Valves
- Butterfly Valves
- Duo-Chek Valves

11. Hydrogen Generation

- Cast Steel Bolted Bonnet GGC*
- Pressure Seal GGC* Valves
- Metal Seated Ball Valves
- Triple Offset Valves
- Duo-Chek Valves
- Noz-Chek Valves
- Strainer

12. Cogeneration (Power & Steam)

- Cast Steel Bolted Bonnet GGC*
- Pressure Seal GGC* Valves
- Pressure Seal Non-Return Valves
- Vent & Drain Valves
- Extraction Check Valves
- Butterfly Valves
- Lined Valves

Multi-turn Valves

Bolted Bonnet Gate & Globe

Brands: Aloyco, CRANE, Jenkins, Krombach, Pacific, Stockham, Triangle

ASME Class: 150 - 1500

PN: 10 - 100

Sizes: ½" - 36"

DN: 15 - 900

Materials: Carbon Steel, Stainless, Special Alloys, Iron, Bronze, Special Materials

Connections: Flanged, Welded, Threaded, Soldered

Features and Benefits

- Globe valves are available in globe stop and stop-check (non-return) configurations
- Body is cast with straight through ports to minimize turbulence, erosion and pressure drop
- Seat rings are seal welded to eliminate leak path behind rings and for long trouble-free service
- CRANE's gate valve includes a one piece flexible disc providing accurate alignment of mating seating surfaces so the valve can absorb piping strains without leakage and avoid any tendency to stick in the seated position
- Packing contains corrosion inhibitor to avoid stem pitting
- Stuffing box is deep, assuring long packing life
- Gland eyebolts swing aside for ease in repacking the stuffing box



Pressure Seal Gate & Globe

Brand: Pacific

ASME Class: 600 - 4500

Sizes: 2" - 36"

DN: 50 - 900

Materials: Carbon Steel, Alloy

Connections: Butt Weld, Flanged, Venturi

Features and Benefits

- Gate valves offered in two designs: parallel disc and flexible wedge
- Globe valves available in both y-pattern and t-pattern, as well as both globe stop and stop-check (non-return) configurations
- Provides superior shutoff service for your high pressure and temperature applications
- The parallel disc gate valve eliminates excessive leakage, thermal binding and maintenance
- Globe valve bodies have streamlined flow path to minimize pressure drop
- Stainless steel, precision ground stems to minimize packing friction
- Globes have fully fabricated yokes designed to withstand seismic activity, while offering easy maintenance and actuator mounting



HF Alkylation Valves

HF Alkylation - Gate, Globe & Check

Brand: Pacific
ASME Class: API 600 (150 - 600) API 602 (300 - 800)
Sizes: 1½" - 36"
DN: 40 - 900
Materials: Carbon Steel or Monel®
Trim: Monel® or Hasteloy C®
Connections: Flanged, Socket Weld, Threaded

Features and Benefits

- More than 60 years of refinery-proven performance
- Dependable, long-lasting shutoff
- Low emissions, testing to API Standard 622 and EPA Method 21
- UOP Process Division Approved
- COP Licensing Listed
- Inherently fire-safe design
- High integrity shutoff design combines Teflon®/metal to metal seating for true fire-safe/bubble tight isolation



HF Alkylation - Sleeved Plug

Brand: XOMOX
ASME Class: 150 - 600
Sizes: ½" - 24"
DN: 15 - 600
Material: Monel®
Connections: Flanged, Socket Weld, Threaded

Features and Benefits

- More than 35 years of refinery-proven performance
- Dependable, long-lasting shutoff
- UOP Process Division Approved
- COP Licensing Listed
- PTFE seals ensure bubble-tight shutoff
- Multiple seals protect against stem leakage
- Full port available
- Full mechanically locked Teflon® sleeve/seat eliminates cold flow and provides best mean time between repair
- EPA method 21 emission testing



Note: CRANE's XOMOX Tufline line of products also includes lined ball valves, lined butterfly valves and lined pipes, fittings and accessories used in both sulfuric and HF Alkylation.

Monel® is a registered trademark of the International Nickel Co., Inc.
 Hastelloy C® is a registered trademark of Hayes International.
 Teflon® is a registered trademark of E. I. du Pont de Nemours and Company or its affiliates.

Quarter Turn Valves

Wedgeplug

Brand: Pacific Wedgeplug

ASME Class: 150 - 1500

Sizes: ½" - 36"

DN: 15 - 900

Materials: Carbon Steel, Stainless Steel, Alloy Steel, Special Alloys

Connections: Butt Weld, Flanged, Threaded

Body Styles: Special Configurations Available

Features and Benefits

- More than 80 years successful experience addressing hot, dirty and severe refining applications, including delayed coking, ethylene cracking, fluidized catalytic cracking and asphalt production
- Superior total cost of ownership in delayed coking for future maintenance and steam costs
- Provides outstanding protection from: erosion damage; solids build-up on sealing surfaces and in cavities; residual freeze up which can prevent operation and cause leakage due to packing wear
- Easy low torque operation with Wedgetorque™ lift, rotate, reseal design preventing seat wear
- In-line repair, a significant operating and maintenance cost saving benefit



Metal Seated Ball

Brand: Krombach

ASME Class: 150 - 4500

PN: 10 - 600

Sizes: ½" - 16"

DN: 15 - 400

Materials: Carbon Steel, Stainless Steel, Special Materials

Connections: Flanged, Welded, Threaded

Body Style: Two-Piece

Features and Benefits

- Low repair cost (single parts exchangeable)
- Bi-directional with repeatable zero leakage
- Fire-safe and anti-static (API and BS)
- Anti-blowout stem
- Highest life span
- Best technical solutions
- Best after sales service
- Optimal torque transmission
- International DIN and ASME standards and rules
- High temperature applications to 800°C or 1500°F
- Highest reliability over 20 years of proven design and manufacturing experience



Quarter Turn Valves

Triple Offset Valves

Brands: Flowseal MS, Krombach

ASME Class: 150 - 600

PN: 10 - 100

Sizes: 3" - 96"

DN: 80 - 2400

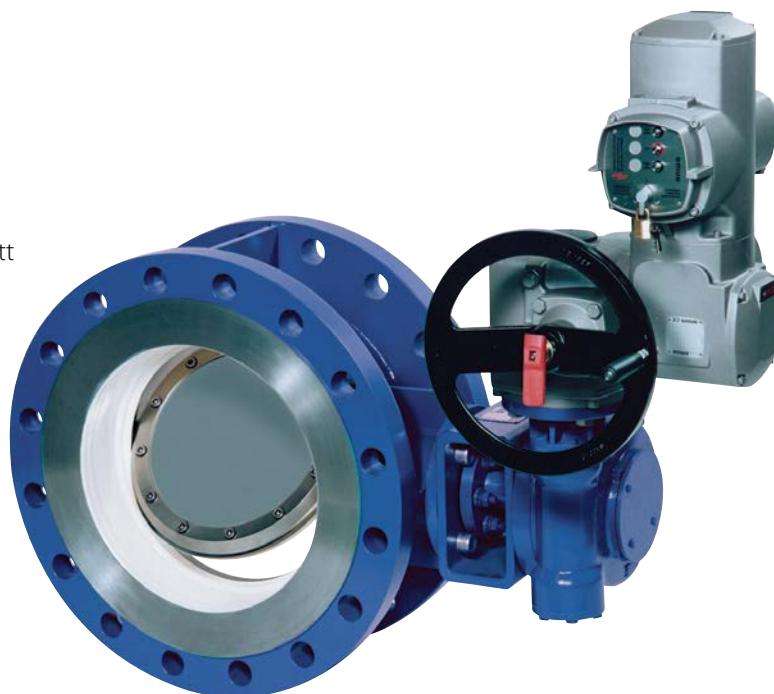
Materials: Carbon Steel, Stainless Steel, Special Materials

Body Styles: Lugged, Double Flanged Short or Long Pattern, Butt Weld Ends, Customize Ends

Features and Benefits

- Bi-directional gas tightness
- Innovative self-centering, flexible disc sealing
- Pure graphite - spring loaded shaft packing
- Design flexibility provides customized solutions
- TA-Luft approved
- Optimal torque transmission
- Fire-safe design according to EN ISO 10497

Note: High Performance and Resilient Seated Butterfly valves also available.



Soft Seated Ball

Brands: Aloyco, CRANE, Jenkins, Krombach, Stockham

ASME Class: 150 - 2500

PN: 10 - 420

Sizes: ¼" - 24"

DN: 8 - 600

Materials: Carbon Steel, Stainless, Bronze, Brass

Connections: Threaded, Socket Weld, Soldered, Flanged, Wafer

Body Styles: One-Piece, Two-Piece, Three-Piece

Features and Benefits

- Low repair cost (single parts exchangeable)
- Fire-safe and antistatic (API, BS, DIN)
- Anti-blowout stem
- Optimal torque transmission
- Highest reliability over 20 years of proven design and manufacturing experience
- Available in different designs (two piece and compact wafer)
- Full bore, reduced bore and T bore or L bore for 3-way ball valves
- Bi-directional
- Cryogenic applications
- Actuation mounting flange according DIN ISO 5211
- International DIN and ASME standards and rules



Quarter Turn Valves

Steam Traced & Jacketed High Performance Butterfly

Brand: XOMOX Tufline

ASME Class: 150, 300, & 600

Sizes: 6" - 48"

Materials: Carbon Steel Body with Stainless Disc optional materials available upon request

Body Style: Lug

Features & Benefits

Steam Traced Jacketed High Performance Butterfly valves offer a full 3-point valve heating system including the stem, body, and disc. This is a must for processing sulfur or other agglomerating media (any material that must be kept above a particular temperature to avoid solidification). The customer can have years of trouble free operation and inline sealing with this valve.

Other features and benefits include:

- Integral, full-body steam jacket
- Integral steam tracing of shafts and disc circumference
- Steam tracing means sulfur does not solidify in the valve
- Optional NACE trim
- Optional seal bearings
- Optional double-packed stems with lantern rings
- Optional fire tested and high-temperature seat designs



Sleeved Plug

Brand: XOMOX Tufline

ASME Class: 150, 300, 600

Sizes: ½" - 16"

Materials: Carbon Steel, Stainless, Special Alloys

Connections: Butt Weld, Flanged, Threaded

Features & Benefits

- Provides exceptional sealing to atmosphere
- Adjustable in-line seal to maintain tight shutoff
- Double stem seal is standard – enhanced stem seal options are available
- No cavities or pockets where media can collect, contaminate or build up excessive pressure
- The sleeve provides all the lubrication the valve will ever need
- Bi-directional sealing
- Steam jacketed version available
- 2-way and 3-way configuration available
- Double block & bleed configuration available



Quarter Turn Valves

High Performance Butterfly

Brands: Flowseal, Stockham

ASME Class: 150 - 600

Sizes: 2" - 48"

DN: 50 - 1200

Materials: Carbon Steel, Stainless, Aluminum Bronze

Body Styles: Wafer, Lugged (Double Dead End)

Features & Benefits

- Soft seat design provides bubble tight shutoff
- Metal seated; ASME Class IV Leakage
- Wafer and lug body styles
- ASME pressure classes 150, 300 and 600
- Fire-safe, meets API 607, Rev. 4
- MSS-SP-68
- Unparalleled service in vacuum-to-low pressure
- Automated valves: pneumatic, electric and hydraulic



Resilient-Seated Concentric Butterfly

Brands: Center Line, CRANE, Jenkins, Krombach, Stockham

ASME Class: 150 CWP

Sizes: 1½" - 54"

DN: 40 - 1350

Materials: Carbon Steel, Stainless, Cast Iron, Ductile Iron

Body Styles: Wafer, Lugged, Double Flanged

Features & Benefits

- Qualified for both gaseous and liquid service
- Positive shutoff bi-directionally
- Phenolic backed cartridge seat
- PTFE bushing standard
- Locking handle standard 2" - 12"
- End of line service standard on lug style
- Ease of automation
- Field repairable 2" - 24"
- Complete size range: 1½" - 54"



Flow Reversal Protection Valves

Nozzle Check (Compact & Full Body)

Brands: Compac-Noz, Noz-Chek

ASME Class: 150 - 4500

Sizes: 2" - 84"

DN: 50 - 2100

Materials: Iron, Steel, Stainless

Connections: Flanged, Hub-End, Weld-End

Standards: ASME, DIN, JIS

Features and Benefits

- Engineered and sized for the application, not the line size
- One piece body casting (no body penetration, no fugitive emission to atmosphere)
- One moving part resulting in minimum wear and long life
- Short stroke length resulting in quick dynamic response and minimizing the reverse velocity through the valve, thus preventing water hammer risks
- Suitable for reciprocating compressor service (removal of chatter effects frequently associated with conventional check valves)
- Stable behavior due to the Venturi type design, the opening characteristics ensure a fully opened check valve
- Choice of spring torques to suit critical velocity systems and improve valve response time
- Anti-spinning device to stabilize disc
- Tight shutoff
- Maintenance free design



Engineered Check/Extraction Check

Brand: Krombach

ASME Class: 150 - 300

PN: 16 - 40

Size: 6" - 72" (others upon request)

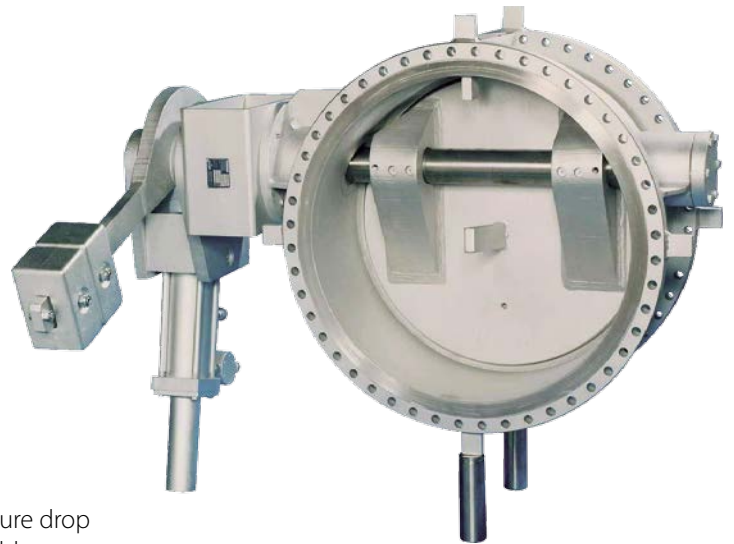
DN: 150 - 1800 (others upon request)

Material: Steel, Stainless Steel, Welded Design

Connection: Double Flanged, Butt Weld Ends

Optional Features

- Free swinging disc
- Hardened seating surfaces
- Canted seat angle
- Hardened bushings
- Graphite packing
- Counterweights & actuation packages available
- Customized seat diameter & disc thickness to minimize pressure drop
- Special face-to-face dimensions, flanges, and materials available
- Special approvals (ASME, CRN, IBR)



Flow Reversal Protection Valves

Dual Plate Check

Brand: Duo-Chek

ASME Class: 125 - 4500

Sizes: 2" - 84"

DN: 50 - 2100

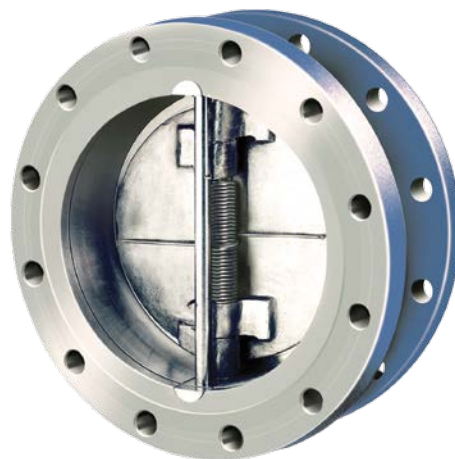
Materials: Steel, Stainless, Exotic Metals

Connections: Wafer, Lugged, Flanged

Standards: ASME, DIN, JIS, AS

Features and Benefits

- Lightweight & compact compared to the traditional swing check valve
- Spring assisted closure (independent spring design), plates are more responsive to changes in flow conditions
- Faster response time improved by the use of independent springs and support sleeves, minimizes water hammer risks for non-slam applications
- Retainerless design available (no fugitive emission to atmosphere, valve is inherently fire-safe)
- Choice of spring torques to suit critical velocity systems and improve valve response time (can be engineered to the application)
- Wide range of body configuration & materials wafer, lug, double flanged, weld-end & hub-end connections
- Lower life cycle cost provides lower initial cost, no maintenance and low pressure loss over the long service life of the valve



Swing Checks, Bolted Bonnet Check, Pressure Seal Check, Uni-Chek

Brands: Aloyco, CRANE, Pacific

ASME Class: 150, 300

(600 Bolted Bonnet), (600 - 2500 Pressure Seal)

Sizes: 2" - 24" (2" - 36" Uni-Chek)

Materials: Iron, Steel, Stainless

Features and Benefits

- Used to prevent reversal of flow in horizontal pipe lines
- Swing checks can be furnished with outside lever and adjustable weight to assist disc in closing
- Tilting check valve design reduces slam by reducing the disc travel distance
- There is no tendency for the seating surfaces to gall or score, because the disc meets the flat seat squarely without rubbing contact upon closing
- CRANE cast steel swing check valves can be furnished with outside lever and adjustable weight in certain sizes, to assist in closing the valve more rapidly, thus minimizing reversal of flow and resultant surge and shock
- With the lever and weight mounted to balance the weight of the disc, the valve becomes more sensitive to low flow velocities
- Also available in a tilting disc configuration



Automated Valve Packages

Pneumatic (Direct or Bracket Mount)

Types: Double Acting, Spring Return

Brands: Revo, CRANE, CRANE Air

Sizes: ¼" - 48"

DN: 8 - 1200

Torque Range: lbf-in: 30 - 6,000,000; Nm: 12 - 677,908

Features and Benefits

- Aluminum alloy construction provides superior corrosion resistance and durability
- Patented three-point guiding system
- Precision machining for tight tolerances to minimize gear backlash
- Standard NAMUR accessory interfaces
- ISO 5211 mounting flange



Electric (Direct or Bracket)

Brand: CRANE

Sizes: ¼" - 16"

DN: 8 - 400

Torque Range: lbf-in: 347 - 17,359; Nm: 39 - 1,960

Features and Benefits

- Compact and lightweight
- Available for on/off or modulating duty
- All circuitry encapsulated to protect against moisture, heat and vibration
- Instantaneous motion stop circuit (modulating version eliminates hunting and overrun and guarantees 250 steps over entire 90° range)
- Self-locking final reduction worm gear holds last position if power is lost
- Valve position indicator built into actuator
- Maintenance-free design



Strainers & Specialty Products

Strainers (Y-type, T-type & Basket Type)

Brand: Krombach

ASME Class: 150 - 1500

PN: 6 - 400

Sizes: ½" - 40"+

DN: 15 - 1000+

Screen: Stainless Steel

Materials: Carbon Steel, Stainless Steel, Cast Iron, Ductile Iron, Special Materials

Body Styles: Flanged, Welded, Threaded

Features and Benefits

- Cover lift and swivel devices
- Differential pressure connections/indicators
- Vent & drain connections/valves
- Supporting legs
- Special materials
- Special painting/coating
- Internal rubber lining
- Gasket according to TA-Luft for Fugitive Emissions
- Special sealing surface
- Oil & grease-free (for O2)
- Heating or cooling jacket
- Special mesh sizes



Specialty Products

Sight Glasses

Through our Krombach line, we provide a variety of sight glasses available up to PN 40 (in DIN dimensions only).

Vessel Bottom Valves

Krombach also makes a vessel bottom ball valve for use in critical service applications.

Bottom Drain Valves

Our Krombach line includes a very useful valve design for vessel bottom draining systems. Available up to PN 40 (in DIN dimensions only).

Engineered Strainer Assemblies

Krombach also has the capability to design and build engineered strainers for specialty applications. These are designed and manufactured to meet customers needs.



Valve Services

Focus on the Customer

When we try harder to make a customer than a dollar, we often find that the profit will largely take care of itself. We know that our competitive advantage not only depends on selling products and services to our customers, but on finding solutions with our customers that expand their capacity for growth. Everyone's job at CRANE Co., no matter what it is, is really a job to please the customer.

Remanufacturing Process

CRANE's unique remanufacturing process includes a fully operational quality management philosophy of continuous improvement. This process benefits the customer by reducing the long term costs of ownership, promoting safety in the workplace, protecting the environment, saving raw materials and conserving energy. Remanufacturing insures the valve is serviced and rebuilt resulting in a product that is as functional and reliable as new.



CRANE Energy's Valve Services has the qualifications and experience to provide a complete range of on-site and off-site repair and maintenance services, from routine valve service to HF Acid decon to a complete valve diagnostic and optimization program. We are available 24 hours a day, 7 days a week for services on virtually any valve type, size, manufacturer to include: process valves, motor-operated valves, air-operated valves, pressure relief valves, and field instruments. Additional services include on-site in-line machining, electric actuator service, and MOV / AOV diagnostics.

The Valve Services business unit is known for its expertise in the refurbishment of CRANE Products. This reputation has grown from the implementation of a process for valve refurbishment which takes a used valve back through the manufacturing process called "remanufacturing". This same process is also used for repair of all manufacturers' products regardless of whether the repair is performed in our shop or at your site. Our field equipment includes a fleet of 44' mobile machine shops and 44' valve actuator service trailers which are equipped with portable diagnostic equipment, portable seat grinders, weld machines, hydro-pik packing extractors, as well as various tools and equipment.

Our staff of certified welders, machinists, technicians project planners, and asset managers adhere to the most demanding industry standards. Additionally, valve repair reports accompany each valve serviced in order to satisfy the requirements of OSHA 1910.119 (PSM) and our customers.

Below is a list of the types of refinery valves we service:

- Process block valves
- FCC unit slide valves
- Coker unit isolation and switch valves
- Distillation unit gate, globe, check, butterfly and plug valves
- Alkylation unit high alloy valves
- Hydrocracking unit high alloy and high pressure valves
- Hydrogen unit high alloy and high pressure valves
- Reforming unit process block valves
- Oil movements MOV valves
- Electric actuated, multi-turn, quarter turn & ESD valves (all manufacturers)
- Control valves (all manufacturers)
- Pressure relief and safety valves (ASME I and VIII)

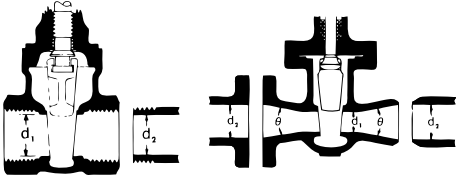
Certifications:

- ISO 9001 - 2000 facility
- ASME NBBI "VR" certified

Representative Resistance Coefficient K for Valves & Fittings

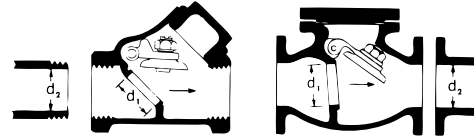
GATE VALVES

Wedge Disc, Double Disc, or Plug Type



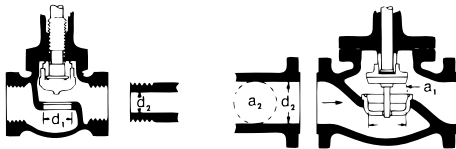
If: $\beta = 1, \theta = 0 \dots \dots \dots K_1 = 8 f_T$
 $\beta < 1$ and $\theta \geq 45^\circ \dots \dots \dots K_2 = \text{Formula 4}$
 $\beta < 1$ and $45^\circ < \theta \leq 180^\circ \dots \dots \dots K_2 = \text{Formula 6}$

SWING CHECK VALVES

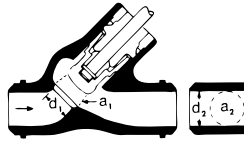


$K = 100 f_T$
 Minimum pipe velocity (fps) for full disc lift = 35 \sqrt{V}
 $K = 50 f_T$
 Minimum pipe velocity (fps) for full disc lift = $60\sqrt{V}$ except
 U/L listed = $100\sqrt{V}$

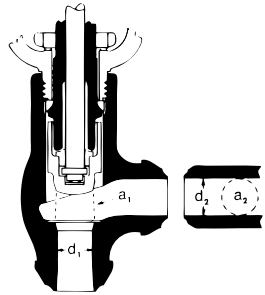
GLOBE AND ANGLE VALVES



If: $\beta = 1 \dots K_1 = 340 f_T$

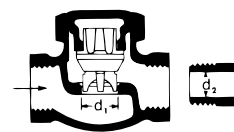


If: $\beta = 1 \dots K_1 = 55 f_T$

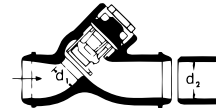


If: $\beta = 1 \dots K_1 = 150 f_T$ If: $\beta = 1 \dots K_1 = 55 f_T$
 All globe and angle valves,
 whether reduced seat or throttled,
 If: $\beta < 1 \dots K_2 = \text{Formula 7}$

LIFT CHECK VALVES

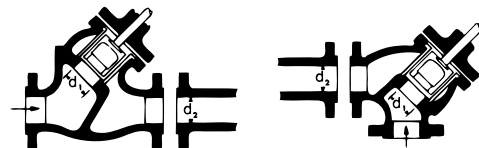


If: $\beta = 1 \dots K_1 = 600 f_T$
 $\beta < 1 \dots K_2 = \text{Formula 7}$
 Minimum pipe velocity (fps) for full disc lift = $40 \beta^2 \sqrt{V}$



If: $\beta = 1 \dots K_1 = 55 f_T$
 $\beta < 1 \dots K_2 = \text{Formula 7}$
 Minimum pipe velocity (fps) for full disc lift = $140 \beta^2 \sqrt{V}$

STOP-CHECK VALVES (Globe and Angle Types)



If: $\beta = 1 \dots K_1 = 300 f_T$ If: $\beta = 1 \dots K_1 = 350 f_T$
 $\beta < 1 \dots K_2 = \text{Formula 7}$

Minimum pipe velocity (fps) for full disc lift = $60 \beta^2 \sqrt{V}$

Formula 1

$$K_2 = \frac{0.8 \left(\frac{\sin \frac{\theta}{2} \right) (1 - \beta^2)}{\beta^4} = \frac{K_1}{\beta^4}$$

Formula 2

$$K_2 = \frac{0.5 (1 - \beta^2) \sqrt{\sin \frac{\theta}{2}}}{\beta^4} = \frac{K_1}{\beta^4}$$

Formula 3

$$K_2 = \frac{2.6 \left(\frac{\sin \frac{\theta}{2} \right) (1 - \beta^2)^2}{\beta^4} = \frac{K_1}{\beta^4}$$

Formula 4

$$K_2 = \frac{(1 - \beta^2)^2}{\beta^4} = \frac{K_1}{\beta^4}$$

Formula 5

$$K_2 = \frac{K_1}{\beta^4} + \text{Formula 1} + \text{Formula 3}$$

$$K_2 = \frac{K_1 + \sin \frac{\theta}{2} 0.8 (1 - \beta^2) + 2.6 (1 - \beta^2)^2}{\beta^4}$$

Formula 6

$$K_2 = \frac{K_1}{\beta^4} + \text{Formula 2} + \text{Formula 4}$$

$$K_2 = \frac{K_1 + 0.5 \sqrt{\sin \frac{\theta}{2}} (1 - \beta^2) + (1 - \beta^2)^2}{\beta^4}$$

Formula 7

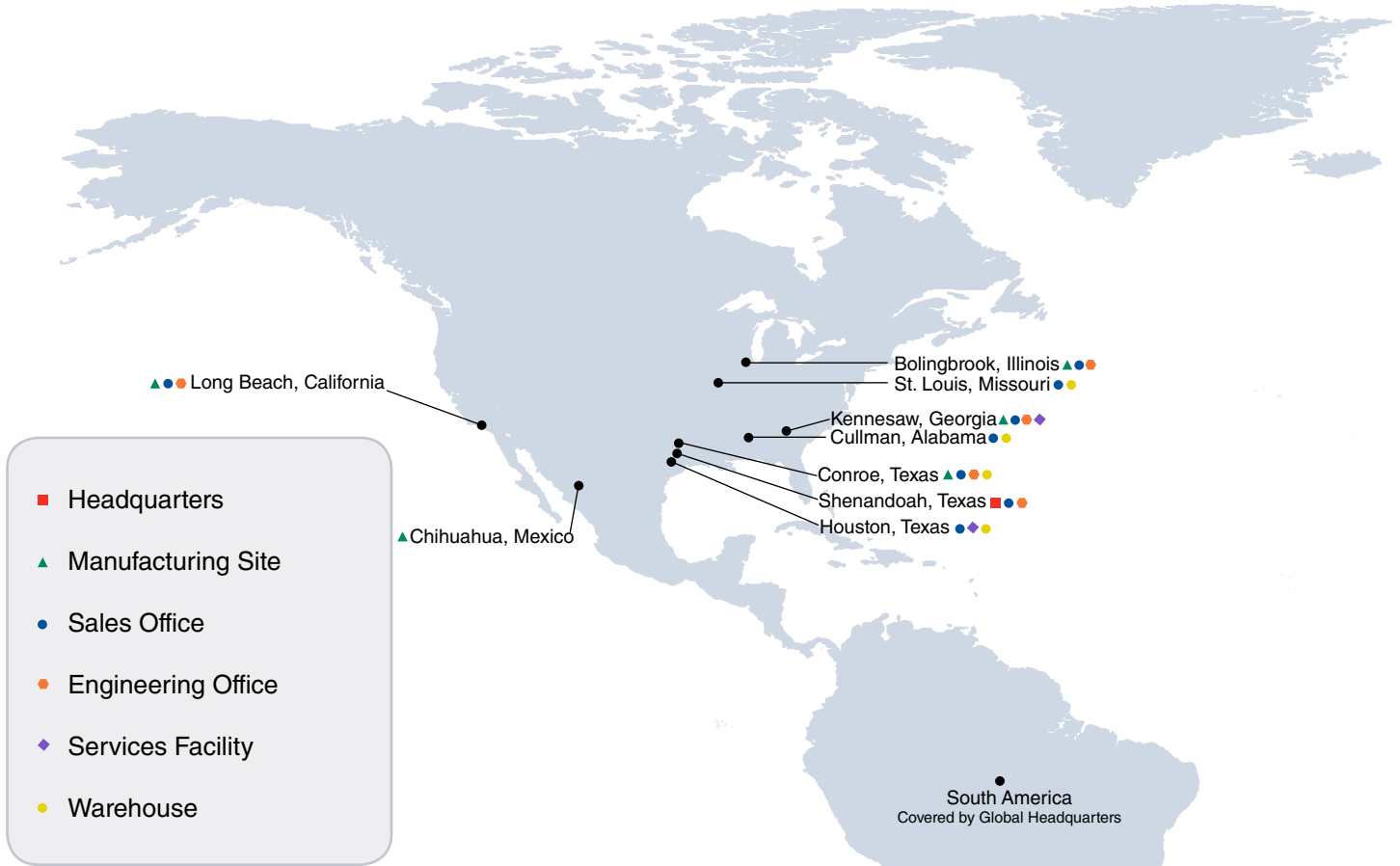
$$K_2 = \frac{K_1}{\beta^4} + \beta (\text{Formula 2} + \text{Formula 4}) \text{ When } \theta = 180$$

$$K_2 = \frac{K_1 + \beta 0.5 (1 - \beta^2) + (1 - \beta^2)^2}{\beta^4}$$

$$\beta = \frac{d_1}{d_2} \qquad \beta^2 = \left(\frac{d_1}{d_2} \right)^2 = \frac{a_1}{a_2}$$

Subscript 1 defines dimensions and coefficients with reference to the smaller diameter. Subscript 2 refers to the larger diameter.

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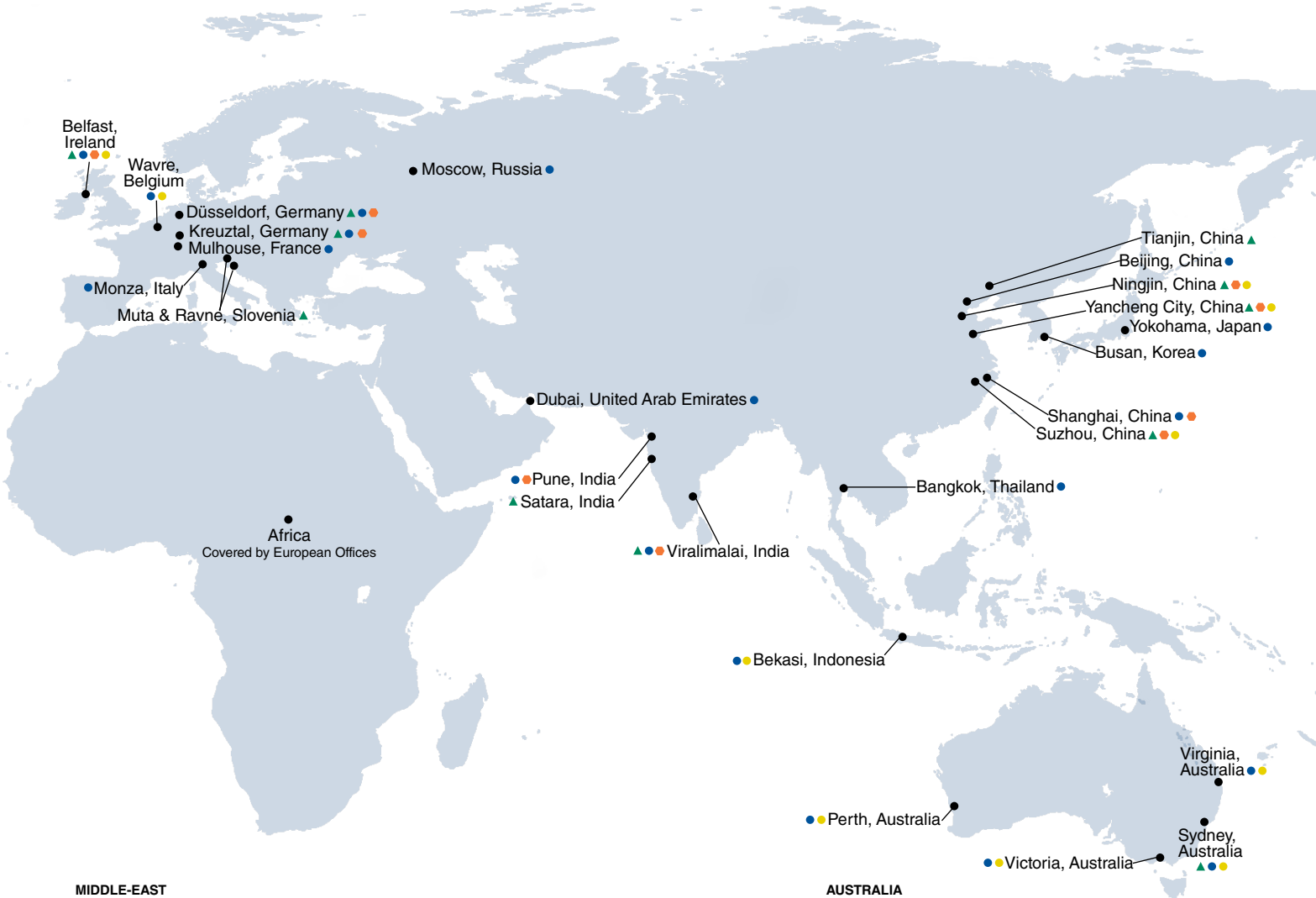
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