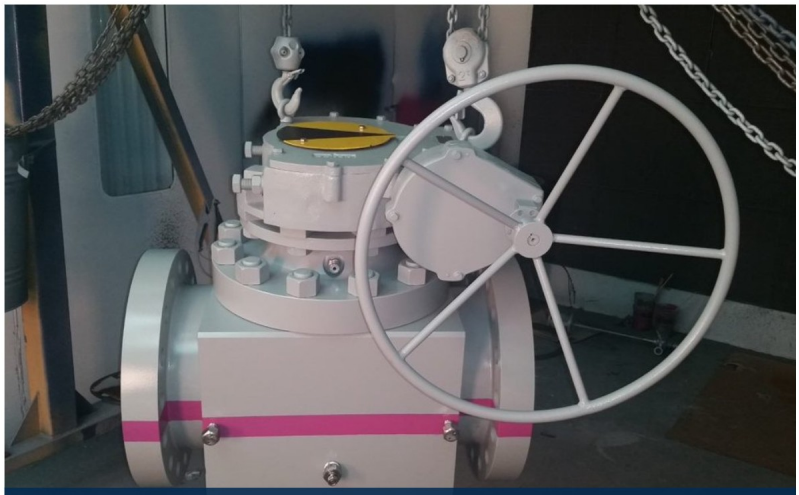
Cornerstone® VALVE
SEVERE SERVICE ENGINEERING

Oil & Gas Production

High cycles, high temperatures, heavy solids, sky-high hazards and high pressures are everyday, extreme conditions for valves in this field.



TE1 top-entry ball valve — ConocoPhillips production service

CASE STUDY · BOQUERÓN FIELD, VENEZUELA · GAS RE-INJECTION

API 10K hub-end ball valves still sealing after 17+ years — where other brands failed.

01 · CHALLENGE

ARCO/BP had to hold field production pressure by compressing and re-injecting natural gas at API 10K — continuous high-pressure gas service at 250°F.

02 · SOLUTION

One-piece top-entry, trunnion-mounted ball valves with integral hub ends in several sizes, with hard-coated 17-4PH trim and chrome-carbide metal seats.

03 · RESULT

Other brands developed seal failures — leak-through and external leaks. **Cornerstone's keep working**, many installed 17+ years ago.

FIELD RECORD

17+ yrs

in gas re-injection service without issue

10K
API rated

250°F
gas service

Repeat order: PDVSA Boquerón, 2012 — 3" and 6" TE1, Class 4500, gas injection.

VALVE SPECIFICATION	Boquerón gas re-injection valves
Design	One-piece top entry, trunnion mounted, in-line repairable through the bonnet
Size / rating	5-1/8" API 10,000 psi (several sizes supplied)
End connections	Integral hub ends
Body	Grade 4C low-alloy steel
Trim	17-4PH stainless with chrome-carbide (CC) coating
Seats	Metal seated — chrome carbide
Service	Natural gas compression & re-injection, 250°F

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6DSS-0073
6D-0164
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ISO 9001

Proven in Production Fields

Operators from the Andes to the Rockies specify Cornerstone top-entry valves for gas injection, sour gas, hot oil and sandy crude. Here is how four of those fields have put them to work:

BP Colombia — Cusiana · Cupiagua · Floreña

API 10K high-pressure gas since 1994

TE1 & TE3 · 1" to 16" · TC-coated balls · Stellite seats

Production and transmission valves for BP's Colombian gas fields — including a 16" API 10K TE1 for Cupiagua (2000) and a full 10K package for Floreña via Schlumberger (2001). In 2015 BP re-ordered 6" and 8" metal-seated TE1s with double-aged 17-4PH H1150 trim.

ConocoPhillips — Lost Cabin, WY

6–8 yrs successful sour-gas plant service

12" ASME 900 trunnion ball · fire-safe body joint

After a third-party rebuild the valve failed within weeks. Cornerstone's RMA teardown traced it to a paper gasket in the fire-safe bonnet joint, incompatible O-rings, a reversed backup ring and an undersized PTFE bearing — then rebuilt it to OEM spec.

> *"This valve was in service and performed successfully for 6–8 years."* — Asset Integrity Supervisor, ConocoPhillips, 2014

Anadarko — Hot oil · 2013–15

Class 2500 trunnion valves for hot oil

TE3 2" to 6" ASME 2500 · FB3 ½" 5,000/6,000 psi

Top-entry trunnion and floating ball valves for hot-oil production service, supplied through Beta International with repeat orders over three years.

ARCO / BP Venezuela — Sandy crude · 1999–2005

Class 4500 valves in abrasive crude

¾" to 2" ASME 4500 ball valves

High-pressure valves for sandy crude production — abrasive, solids-laden service — supplied to ARCO through Parsons in 1999–2000 and re-ordered by BP Venezuela in 2005.

FIELD TURNAROUND · 5,200 VALVES

Cornerstone was called in to turn around an operation where 5,200 valves had been installed and more than 4,000 were inoperable.

DROPPED IN TRANSIT · STILL TIGHT

A metal-seated ball valve fell off a truck en route to a remote site. Ends dressed, gear repaired — it still shut off tight.

ACTUATED TOP ENTRY · READY TO SHIP

Fail-safe actuated top-entry valves with volume tanks and tubed controls, tested and crated at our Texas facility for production service.

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Production Reference List

5 countries
Colombia, Venezuela, USA, Canada and Algeria

Class 4500
for sandy crude and gas injection

Sour service
H_2S and CO_2 gas, produced water

OPERATOR · PROJECT	REGION · SERVICE	VALVES SUPPLIED
BP · Cusiana (1994–2002)	Colombia · HP gas production & transmission	TE1, TE3, D-ball · 1"–8" · API 10K
BP · Cupiagua (2000)	Colombia · HP gas	16" TE1 · API 10K
BP · Floreña, via Schlumberger (2001)	Colombia · HP natural gas	TE1, TE3, checks · 1"–8" · API 10K
BP Colombia (2015)	Colombia · HP gas, PSL 3G tested	6" & 8" TE1, ¾" TE3 · API 10K metal seat
ARCO / BP · Boquerón	Venezuela · Gas re-injection, 250°F	5-1/8" TE1 hub end · API 10K
PDVSA · Boquerón (2012)	Venezuela · Gas injection	TE1 3"–6" · Class 4500
ARCO, via Parsons (1999–2000)	Venezuela · Sandy crude	¾"–2" · Class 4500
BP Venezuela (2005)	Venezuela · Sandy crude	¾" · Class 4500
ConocoPhillips (2009)	Sour production gas; produced water w/ particulates	TE1 6"–8" · Class 600 / 900
Burlington · Lost Cabin (2005)	Wyoming · H_2S, methane & CO_2	2" · Class 600
Anadarko (2013–2015)	Hot oil production	TE3 2"–6" Class 2500 · FB3 ½"
Chevron, via Geoscape (2017–2020)	Oil & gas production	TE3 2"–8" · 8,000 SC / API 10K
ARCO El-Djazair, via M.W. Kellogg (1999)	Algeria · Sweet HP gas	10" · Class 2500 SC
Encana (2009)	Sour production gas	2" chokes · 5,000 psi
Dragon Oil, via AVSCO (2015)	Oil / water / minor gas	3-1/8" adjustable chokes · 5,000 psi
Suncor (1998)	Canada · Tar sands hydrocarbon gas	12" · Class 300
Lagoven (1992)	Venezuela · Gas compression	2" TE1 · Class 600

Drawn from the Colombia reference list (1990–2018), the oil-applications install base and Cornerstone problem-solver case files. Ask your Cornerstone salesperson for serial-level records on any project listed.

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Production Solutions & Testing

01 High Cycles

Standard testing fully cycles every valve under a range of pressures. Complete test documentation ships with the certifications.

02 High Temperature

Cobalt-based hard-facing on sealing surfaces, and even the bolting is selected for its temperature rating.

03 Solids & Sand

Live-loaded scraper seats clean the ball on every cycle. Tungsten carbide, nickel boride or Stellite trims resist erosive flow.

04 Traceability

Every part carries a certificate for chemistry, yield and tensile strength, heat treatment and place of origin.

PRODUCTION PRODUCT LINE

TE1 / TE3 Trunnion Ball Valves

EE3 End Entry Ball Valves

FB2 / FB3 Floating Ball Valves

HPC Adjustable Chokes

D-BALL ROTARY CONTROL · US PATENT 5,070,909

Invented by Cornerstone founder Robert G. Davenport. A low-recovery rotary control design: a fixed, multi-ducted trim element sits against a rotating ducted plug, and transverse ducts in the plug link the passages to stage the pressure drop. Supplied as 2" API 10K TD3 D-Ball valves for BP Cusiana (2002).

HARD-FACING MATCHED TO TEMPERATURE

HVOF spray coatings bond mechanically at roughly 10,000–12,000 psi — economical, with no part distortion. Where thermal cycling would crack that bond, Cornerstone specifies spray-and-fuse coatings with a metallurgical bond approaching **50,000 psi**, and recommends fused coatings above 750°F.

LAUNCHERS & RECEIVERS 300 miles from the nearest infrastructure, every ounce and inch counts: compact top-entry valves with tungsten-carbide, nickel-boride or Stellite scraper trim.

Production Duties We Serve

- Wellhead shut-off
- Produced water w/ solids
- Gas dehydration switching
- Gas re-injection
- Meter runs
- Tar sands gas
- Sand separator dump
- Hot oil supply
- Brine & salt-dome storage
- Sandy crude flowlines
- Sour gas plants
- Fire protection water

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Aftermarket & Field Support

A production valve is only as good as its last rebuild. Cornerstone keeps your valves running to their original design — from the spares you order at shipment to the teardown years later.

WHY OEM REBUILDS MATTER · 12" CLASS 900 TEARDOWN

A valve that served a sour-gas plant for 6–8 years was rebuilt by a third-party shop — and leaked at the trunnion within weeks. Cornerstone's engineering teardown found:

1. **Paper gasket in a fire-safe joint**
   The engineered metal/graphite bonnet seal had been swapped for paper — unsuitable for >2,000 psi fire-safe service.
2. **Wrong seals, installed wrong**
   Brittle, chemically incompatible O-rings, and a stem backup ring fitted on the low-pressure side.
3. **Undersized bearing**
   A thin virgin-PTFE bearing in place of Cornerstone's woven, fabric-reinforced PTFE — letting the shaft shift and extrude the seal.
4. **Damaged ball**
   Pry-tool scoring meant 0.035" off the sphere, strip and re-coat, then diamond lapping to restore it.

ENGINEERING VERDICT

"The valve was not rebuilt in accordance with good practice or suitably for the intended application."

— V.P. Engineering, Cornerstone Valve

SPARES START AT SHIPMENT

When your order ships, Cornerstone engineering issues a recommended-spares list keyed to your PO and valve serial numbers — so the right seals and trim are on the shelf before the first turnaround. Ask about extending standard warranty coverage before it expires.

- **PO-matched** spares list
- **Serial-number** traceable

AS RECEIVED · 12" CL 900

REFURBISHED · 8×6 CL 900

ConocoPhillips valve bodies through the Cornerstone rebuild shop: cleaned, inspected, re-machined where needed, refinished and re-tested before they go back to the field.

Return for Repair (RMA)

Request a Return Material Authorization form, or download it from cornerstonevalve.com, and ship the valve to our Texas facility.

Field Service

Trained Cornerstone personnel travel to your wellsite, gas plant or production facility for assessment and repair.

Operator Training

Hands-on operation and maintenance training for your crews on the Cornerstone valves they run.

Rebuild it right the first time. 281.880.8188 · sales@cornerstonevalve.com

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