Consolidated

a Baker Hughes business

5500 Series

SafeSwitch™ changeover valve

Instruction manual (Rev. A)



Baker Hughes Data Classification: Public

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THIS MANUAL DOES NOT COVER EVERY EQUIPMENT VARIATION OR EVERY CONTINGENCY THAT COULD OCCUR DURING INSTALLATION, OPERATION, OR MAINTENANCE. QUESTIONS NOT ADEQUATELY ADDRESSED SHOULD BE REFERRED TO BAKER HUGHES OR AN AUTHORIZED GREEN TAG™ CENTER (GTC).

Conversion table

All the United States Customary System (USCS) units are converted to metric units using the following conversion factors:		
USCS unit	**Conversion factor**	**Metric unit**
in.	25.4	mm
lb	0.4535924	kg
in^2	6.4516	cm^2
ft^3/min	0.02831685	m^3/min
gal/min	3.785412	L/min
lb/hr	0.4535924	kg/hr
psig	0.06894757	barg
ft-lb	1.3558181	Nm
°F	5/9 (°F-32)	°C

Note: Multiply USCS unit with conversion factor to get metric value.

NOTICE

For valve configurations not listed in this manual, please contact your local GTC for assistance.

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Table of contents

Safety information **5-8**

Introduction **8**

Product description **8**

Cross-sectional view and bill of materials **9-11**

Receipt, storage and handling **12**

Installation **12**

Initial inspection and commissioning **12-13**

Operating instructions **13**

Changeover procedure **13-14**

Isolation and SRV removal procedures **14**

Periodic inspection and preventive maintenance **14-15**

COV disassembly **15**

Cleaning and inspection **15-16**

COV reassembly **16-17**

Functional testing and return to service **17**

Troubleshooting guide **18**

Replacement parts planning **18-19**

Technical data **19**

Appendices **20**

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Safety information

I. Product safety sign and label system

If and when required, appropriate safety labels have been included in the rectangular margin blocks throughout this manual. Safety labels are vertically oriented rectangles consisting of three panels encircled by a narrow border. The panels can contain four messages which communicate:

- The level of hazard seriousness
- The nature of the hazard
- The consequence of human, or product, interaction with the hazard
- The instructions, if necessary, on how to avoid the hazard

The top panel of the format contains a signal word (DANGER, WARNING, CAUTION or ATTENTION) which communicates the level of hazard seriousness.

The center panel contains a pictorial which communicates the nature of the hazard, and the possible consequence of human or product interaction with the hazard. In some instances of human hazards the pictorial may, instead, depict what preventive measures to take, such as wearing protective equipment.

The bottom panel may contain an instruction message on how to avoid the hazard. In the case of human hazard, this message may also contain a more precise definition of the hazard, and the consequences of human interaction with the hazard, than can be communicated solely by the pictorial.

⚠DANGER

Do not remove bolts if pressure is in line, as this will result in severe personal injury or death.

⚠WARNING

Know nuclear “health physics” procedures, if applicable, to avoid possible severe personal injury or death.

⚠CAUTION

Wear necessary protective equipment to prevent possible injury.

CAUTION

Do not drop or strike.

1. **DANGER — Immediate hazards which WILL result in severe personal injury or death.**

2. **WARNING — Hazards or unsafe practices which COULD result in severe personal injury or death.**

3. **CAUTION — Hazards or unsafe practices which COULD result in minor personal injury.**

4. **ATTENTION — Hazards or unsafe practices which COULD result in product or property damage.**

About this manual

- The information in this manual is subject to change without prior notice.
- The information contained in this manual, in whole or part, shall not be transcribed or copied without Baker Hughes’s written permission.
- Please report any errors or questions about the information in this manual to your local supplier.
- These instructions are written specifically for the 5500 Series changeover valve, and do not apply for other valves outside of this product line.

Useful life period

To maximize the useful life of the product, it is essential to conduct annual inspections, routine maintenance and ensure proper installation to avoid any unintended stresses on the product. The specific operating conditions will also impact the useful life of the product. Consult the factory for guidance on specific applications if required prior to installation.

Warranty

Items sold by Baker Hughes are warranted to be free from defects in materials and workmanship for a period of one year from the date of shipment provided said items are used according to Baker Hughes recommended usage. Baker Hughes reserves the right to discontinue manufacture of any product or change product materials, design or specifications without notice.

Prior to installation:

- The valve must be installed, put into service and maintained by qualified and competent professionals who have undergone suitable training.
- All surrounding pipe lines must be thoroughly flushed to ensure all entrained debris has been removed from the system.
- Under certain operating conditions, the use of damaged equipment could cause a degradation of the performance of the system which may lead to personal injury or death.
- Changes to specifications, structure, and components used may not lead to the revision of this manual unless such changes affect the function and performance of the product.

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II. Safety alerts

Read - Understand - Practice

⚠DANGER

1. High temperature/pressure can cause injury. Be sure all system pressure is absent before repairing or removing valves.
2. Don’t stand in front of valve outlet when discharging. STAND CLEAR OF VALVE to prevent exposure to trapped, corrosive media.
3. When inspecting a valve for leakage, BE VERY CAREFUL!

⚠WARNING

1. Allow the system to cool to room temperature before cleaning, servicing or repairing the system. Hot components or fluids can cause severe personal injury or death.
2. Always read and comply with safety labels on all containers. Do not remove or deface the container or container labels. Improper handling or misuse could result in severe personal injury or death.
3. Never use pressurized fluids/gas/air to clean clothing or body parts. Never use body parts to check for leakage or discharge rates of areas. Pressurized fluids/gas/air injected into or near the body can cause severe personal injury or death.
4. It is the responsibility of the owner to specify and provide guarding to protect persons from pressurized or heated parts. Contact with pressurized or heated parts can result in severe personal injury or death.
5. Do not allow anyone under the influence of intoxicants or narcotics to work on or around pressurized systems. Workers under the influence of intoxicants or narcotics are a hazard both to themselves and other employees and can cause severe personal injury or death to themselves or others.
6. Incorrect service and repair could result in product or property damage or severe personal injury or death.
7. These WARNINGS are as complete as possible but not all conceivable service methods nor evaluate all potential hazards.
8. Use of improper tools or improper use of right tools could result in personal injury or product or property damage.
9. This valve product line is not intended for radioactive nuclear applications. Some valve products manufactured by Baker Hughes may be used in radioactive environments. Consequently, prior to starting any operation in a radioactive environment, the proper “health physics” procedures should be followed, if applicable.

⚠CAUTION

1. Heed all service manual warnings. Read installation instructions before installing valve(s).
2. Wear hearing protection when testing or operating valves.
3. Wear appropriate eye and clothing protection.
4. Wear protective breathing apparatus to protect against toxic media.

Note: Any service questions not covered in this manual should be referred to your local GTC.

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Restoring safety

Appropriate service and repair are important to the safe, reliable operation of all valve products. Restoration to original quality and manufacturing specifications will accomplish the desired results. Procedures developed by Baker Hughes as described in the applicable installation and maintenance manual, when correctly applied, will be effective.

III. Safety notice

Proper installation and start-up is essential to the safe and reliable operation of all valve products. The relevant procedures recommended by Baker Hughes, and described in these instructions, are effective methods of performing the required tasks.

It is important to note that these instructions contain various "safety messages" which should be carefully read in order to minimize the risk of personal injury, or the possibility that improper procedures will be followed which may damage the involved Baker Hughes **Consolidated™** product, or render it unsafe. It is also important to understand that these "safety messages" are not exhaustive. Baker Hughes cannot possibly know, evaluate, and advise any customer of all of the conceivable ways in which tasks might be performed, or of the possible hazardous consequences of each way. Consequently, Baker Hughes has not undertaken any such broad evaluation and, thus, anyone who uses a procedure and/or tool, which is not recommended by Baker Hughes, or deviates from Baker Hughes recommendations, must be thoroughly satisfied that neither personal safety, nor valve safety, will be jeopardized by the method and/or tools selected. Please contact your local GTC if there are any questions relative to tools/methods.

The installation and start-up of valves and/or valve products may involve proximity to fluids at extremely high pressure and/or temperature. Consequently, every precaution should be taken to prevent injury to personnel during the performance of any procedure. These precautions should consist of, but are not limited to, ear drum protection, eye protection, and the use of protective clothing (e.g., gloves, etc.) when personnel are in, or around, a valve work area. Due to the various circumstances and conditions in which these operations may be performed on Baker Hughes products, and the possible hazardous consequences of each way, Baker Hughes cannot possibly evaluate all conditions that might injure personnel or equipment. Nevertheless, Baker Hughes does offer certain safety precautions for customer information only.

It is the responsibility of the purchaser or user of Baker Hughes valves/equipment to adequately train all personnel who will be working with the involved valves/equipment. For more information on training schedules, please contact your local GTC. Further, prior to working with the involved valves/equipment, personnel who are to perform such work should become thoroughly familiar with the contents of these instructions.

CAUTION

Wear necessary protective equipment to prevent possible injury.

IV. Warranty information

Warranty statement

Baker Hughes warrants that its products and work will meet all applicable specifications and other specific product and work requirements (including those of performance), if any, and will be free from defects in material and workmanship.

CAUTION

Defective and non-conforming items must be held for Baker Hughes's inspection and returned to the original F.O.B point upon request.

Incorrect selection or misapplication of products

Baker Hughes cannot be responsible for customer's incorrect selection or misapplication of our products.

Unauthorized repair work

Baker Hughes has not authorized any non-Baker Hughes affiliated repair companies, contractors or individuals to perform warranty repair service on new products or field repaired products of its manufacture. Therefore, customers contracting such repair services from unauthorized sources must do at their own risk.

Unauthorized removal of seals

All new valves and valves repaired in the field by Baker Hughes Field Service are sealed to assure the customer of our guarantee against defective workmanship. Unauthorized removal and/or breakage of this seal will negate our warranty.

1. Refer to Baker Hughes's Standard Terms of Sale for complete details on warranty and limitation of remedy and liability.

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CAUTION

Defective and nonconforming items must be inspected by Baker Hughes.

CAUTION

Removal and/or breakage of seal will negate our warranty.

V. Introduction

A. Purpose

This manual provides instructions for receiving, storing, installing, commissioning, operating, inspecting, maintaining, disassembling, reassembling, testing, and identifying replacement parts for the Consolidated **5500 Series SafeSwitch™** changeover valve (COV).

B. Product overview

The 5500 Series SafeSwitch COV is installed upstream of two safety relief valves (SRVs). It allows the operator to transfer the protected process from one SRV to the alternate SRV so that one valve can be inspected, tested, repaired, or replaced while an available relief path is maintained.

C. Scope

- Single-actuation configurations
- Tandem-actuation configurations
- Soft-seat and metal-seat constructions

D. Definitions

Term	Definition
Active SRV	The SRV connected to the process through the selected flow path.
Non-active SRV	The alternate SRV installed and ready for selection.
Isolated flow path	The flow path separated from process pressure by the SafeSwitch seat system.
Changeover	Transfer of the available relief path from one installed SRV to the other.
Bleed valve	Valve used to vent or drain trapped pressure from an isolated flow path.
Positive stop	The mechanical endpoint corresponding to a normal operating position.

VI. Product description

A. General description

The SafeSwitch is a three-port selector-isolation valve with one process inlet and two SRV outlets. A rotating ball plug and seat arrangement selects the active outlet and isolates the alternate outlet. The position indicator and bleed valves feature support controlled changeover and maintenance access.

B. Operating principle

In either normal operating position, one outlet is connected to the process and the other outlet is isolated. During changeover, the indicator hex via the stem moves the ball plug from one positive stop to the opposite positive stop. The operator must complete the transfer without intentionally stopping at an intermediate position.

C. Key features

- Continuous availability of a relief path during normal changeover
- Positive selection of active and non-active SRV flow paths
- Visual indication of the selected flow path
- Bleed valves for controlled release of trapped flow-path pressure
- Single and tandem operating configurations
- Soft-seat and metal-seat options

D. Product identification

Before installation or service, record the valve model, serial number, nominal size, pressure class, body material, seat construction, service designation, connection type, indicator position, and special options from the nameplate and order documents.

Identification field	Record
Model code	
Serial number	
Nominal size	
Pressure class	
Body/trim material	
Seat type	
Service	
Indicator position	
Connection type	
Special options	

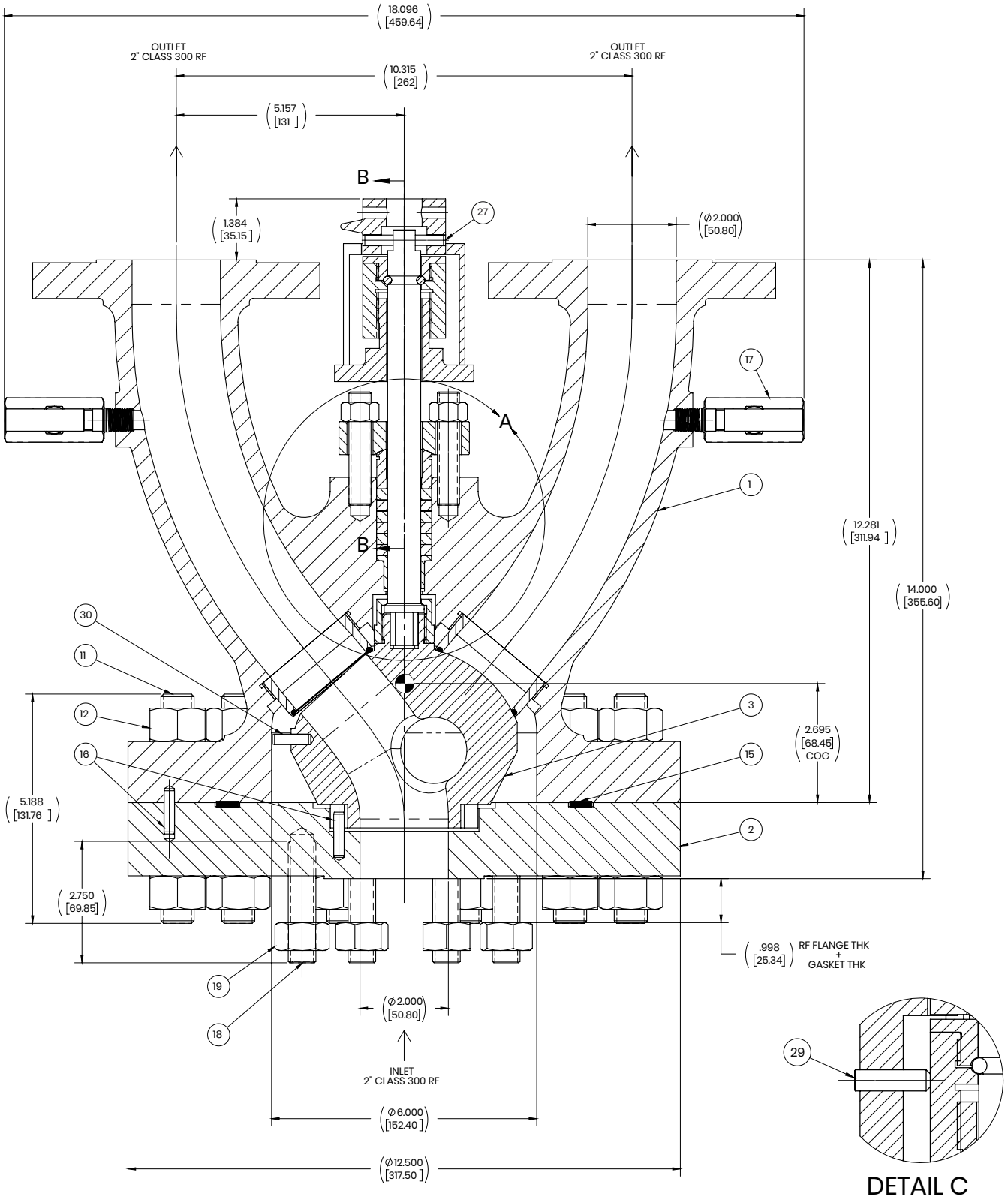
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VII. Cross-sectional view and bill of materials

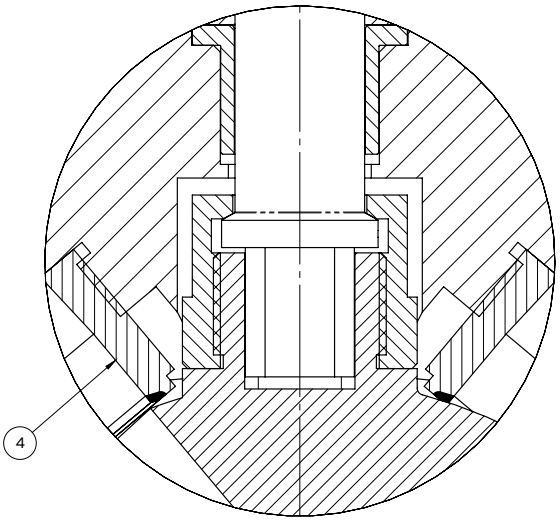
A. General

The representative cross section and component list should be used to identify parts referenced in this manual. Configuration-specific geometry, quantities, materials, and part numbers must be taken from the released assembly drawing and certified bill of materials (BOM) for the valve serial number.

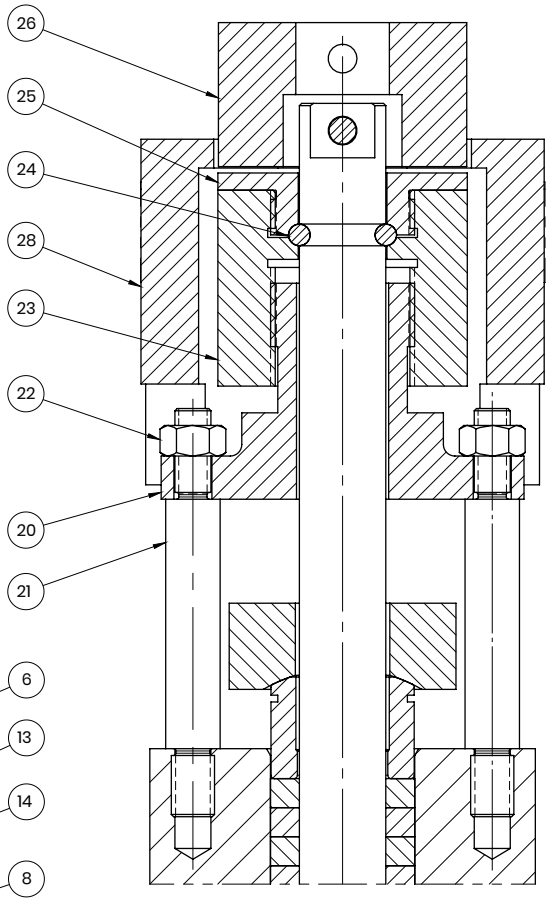
B. 2D cross-sectional view



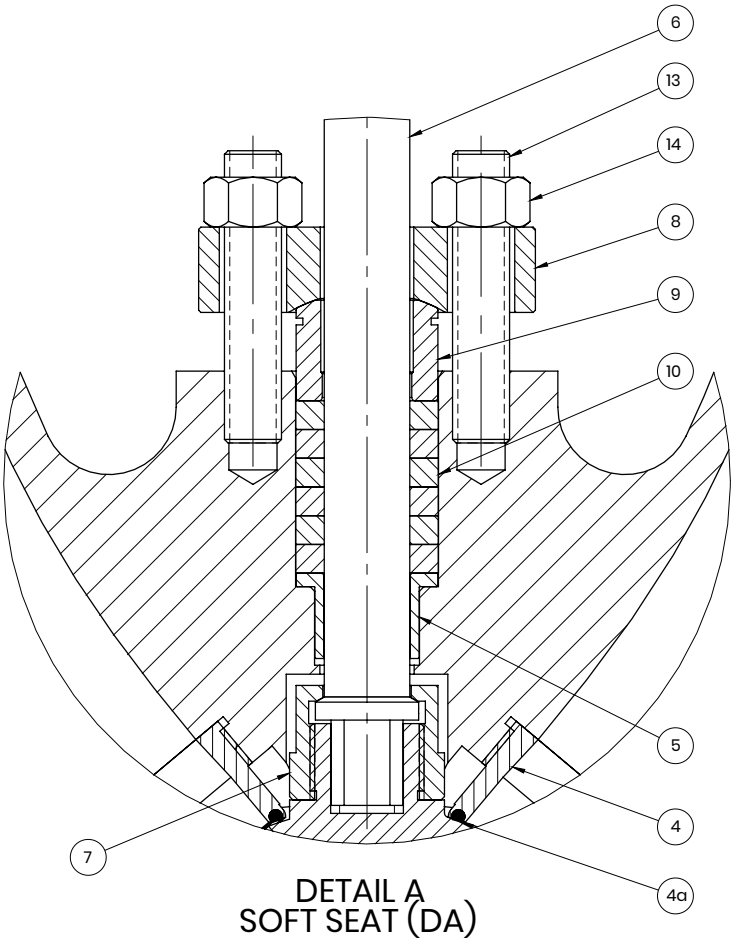
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METAL SEAT (MS)



SECTION B-B



DETAIL A
SOFT SEAT (DA)

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C. Representative bill of materials

Item	Component	Material
1	Base	SA216 WCC Carbon steel
2	Inlet base	SA216 WCC Carbon steel
3	Ball plug	316/316L St St + Chrome plating
4	Seat bushing (DA)	316/316L St St + PTFE
4a	O-ring	Virgin Teflon
4	Seat bushing (MS)	316/316L St St + Stellite
5	Guide	Stellite #6
6	Stem	17-4 Stainless steel
7	Stem ring	316/316L Stainless steel
8	Packing flange	316/316L Stainless steel
9	Packing follower	316/316L Stainless steel
10	Packing split ring	Carbon core braided PTFE
11	Base stud	B7 Alloy steel
12	Base nut	2H Carbon steel
13	Packing stud	B7 Alloy steel
14	Packing nut	2H Carbon steel
15	Gasket	316L St St + Graphite filler
16	Pin	416 Stainless steel
17	Bleed port	316/316L Stainless steel
18	Inlet base stud	B7 Alloy steel
19	Inlet base nut	2H Carbon steel
20	Yoke	316/316L Stainless steel
21	Actuation stud	316/316L Stainless steel
22	Actuation nut	A194 Grade 8
23	Driving nut	17-4 Stainless steel
24	Ball bearing	440C Stainless steel
25	Cap	17-4 Stainless steel
26	Indicator hex	316/316L Stainless steel
27	Indicator pin	18-8 Stainless steel
28	Locking nut	316/316L Stainless steel
29	Set screw	316/316L Stainless steel
30	Ball plug pin	316/316L Stainless steel

Attention: The representative BOM is not an ordering document. Use the valve serial number and released Baker Hughes parts list to identify service parts.

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VIII. Receipt, storage and handling

A. Receiving inspection

1. Inspect the shipping container for damage before unpacking.
2. Compare the nameplate and packing list with the purchase order.
3. Verify that flange protectors, port plugs, bleed valves, indicator, and position indicator are present and undamaged.
4. Report shipping damage and preserve packaging for inspection.

B. Storage and handling

- Store indoors in a clean, dry environment
- Do not subject COVs, either crated or uncrated, to sharp impact. Ensure that the valve is not bumped or dropped during loading or unloading from a truck. While hoisting the valve, take care to prevent bumping the valve against steel structures and other objects.
- Keep inlet and outlet protectors installed until immediately before installation
- Protect machined flange faces, bleed connections, and indicator components from impact and contamination
- For extended storage, follow the project preservation plan and periodically inspect for corrosion or moisture intrusion
- Do not lift by the stem, indicator, bleed valves, linkage, or attached SRVs unless the released lifting plan expressly permits it

IX. Installation

A. Pre-installation checks

1. Confirm the SafeSwitch pressure class, materials, temperature rating, seat type, and service designation are suitable for the application.
2. Confirm both SRVs are correctly sized, set, certified, and compatible with the process and discharge system.
3. Review that the site installation provides adequate support, access for operation, access to bleed valves, and clearance for SRV removal.
4. Remove foreign material from the inlet, outlets, flange faces, and adjacent piping.
5. Verify the indicator hex can reach both positive stops without interference.

B. Orientation and support

Install the assembly in the orientation shown on the released general arrangement drawing (GAD). Support connected SRVs and discharge piping so that external loads are not transferred into the SafeSwitch beyond allowable values. Do not use flange bolting to force misaligned piping into position.

C. Flange connections

- Use gaskets compatible with the process, flange facing, pressure class, and temperature
- Ensure gasket inside diameters do not obstruct the flow passages
- Clean flange faces and inspect for damage
- Tighten bolting using the site-approved cross-pattern procedure and the released bolting specification
- After initial pressurization and thermal stabilization, inspect all joints in accordance with site requirements

D. SRV installation

Install each SRV in accordance with its applicable instruction manual. Confirm the inlet connection, discharge arrangement, set pressure, materials, and orientation. Label the two flow paths consistently as SRV A and SRV B, indicator position, maintenance records, and discharge piping.

E. Tandem configuration

For tandem assemblies, verify both changeover units are mechanically synchronized and reach their corresponding positive stops. Do not adjust linkage length, keying, or timing without the released tandem assembly procedure.

X. Initial inspection and commissioning

A. Pre-start-up checklist

Check	Acceptance
Nameplate/order verification	Configuration agrees with project requirements.
Mounting and support	Assembly is aligned and independently supported.
SRV A and SRV B	Installed, certified, and connected to discharge piping.
Bleed valves	Closed and capped or routed as required.
Position indicator	Agrees with selected active flow path.
Indicator hex travel	Moves to both stops without interference.
Fasteners	Installed and tightened per site/industry standards.

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B. Controlled pressurization

1. Place the SafeSwitch at a positive stop with the designated start-up SRV active.
2. Confirm the isolated-flow-path bleed valve is closed.
3. Pressurize the system using the approved site start-up procedure.
4. Inspect external pressure-boundary joints and bleed valve connections for leakage.
5. Verify the active SRV flow path is pressurized and the standby flow path remains isolated.

C. Commissioning record

Record the start-up position, operator identity, date, leakage inspection result, and any abnormal condition in the equipment history file.

XI. Operating instructions

A. Normal operating positions

Position	Active flow path	Isolated flow path
A	SRV A	SRV B
B	SRV B	SRV A

B. Position indication

The position indicator identifies the selected flow path. At each positive stop, verify the indicator agrees with the expected active SRV and with any flow-path labeling. A damaged, loose, or ambiguous indicator must be corrected before relying on the assembly for planned maintenance.

C. Operating limitations

- Do not exceed the released pressure-temperature rating
- Do not use the SafeSwitch as a throttling valve
- Do not leave the indicator between positive stops
- Do not force the indicator hex if required torque is abnormal
- Do not remove an SRV solely on the basis of indicator position
- Do not vent hazardous media without an approved collection or disposal arrangement

XII. Changeover procedure

A. Pre-conditions

- The operator is trained and authorized
- The non-active SRV is installed, connected, and available for service
- The isolated flow-path bleed valve is closed
- Discharge piping is available and unobstructed
- The area is controlled and required personal protective equipmentis in use
- A changeover log entry has been initiated

B. Transfer from SRV A to SRV B

1. Verify the indicator shows SRV A active, the mechanism is in its normal operating position at the A positive stop, and process flow is directed to SRV A while SRV B is isolated.
2. Verify SRV B is correctly installed, connected, and available for service, and confirm its bleed valve is fully closed.
3. Inspect the indicator, stem, drive nut, and linkage for damage or obstruction. Remove any locking devices that prevent operation.
4. Rotate the drive nut clockwise to retract the ball plug downward and disengage it from the SRV B-side seat.
5. Rotate the stem with the indicator hex smoothly toward position B. Rotate the stem through the full 180° transfer until the ball plug travels to the positive stop at the pin (16) and is aligned with the alternate seat beneath SRV A. Do not stop or secure the mechanism at an intermediate position.
6. Rotate the drive nut counterclockwise to move the ball plug upward into the SRV A-side seat and establish positive isolation of SRV A.

⚠ WARNING

Trapped pressure is present on the isolated side of the changeover valve. Stand clear of the bleed discharge and slowly vent all trapped pressure through the bleed valve. Verify pressure has been relieved before proceeding. Fully close the bleed valve after venting.

7. Vent trapped pressure on the A-side via the bleed valve (see section XIII.B for depressurization procedure). Once vented, fully close the bleed valve.
8. Verify the indicator shows SRV B active and the mechanism is at the B positive stop. Confirm process flow is directed to SRV B and SRV A is isolated.
9. Reinstall the locking devices to prevent unintended movement.
10. Inspect the SafeSwitch, bleed valves, SRV connections, and flow-path piping for external leakage.
11. Document the final position and operating observations in the changeover log.

C. Transfer from SRV B to SRV A

Use the same sequence, substituting SRV A for SRV B and completing travel to the A positive stop.

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D. Abnormal operating torque

If actuation cannot be completed with the indicator hex or if torque rises unexpectedly, stop applying force. Do not add an extension or impact tool unless specifically permitted by the released procedure. Maintain overpressure protection, restrict access, and investigate possible pressure lock, debris, corrosion, linkage interference, seat damage, or mechanical misalignment.

⚠ WARNING

Never intentionally stop or secure the SafeSwitch in an intermediate position. Complete travel to a verified positive stop.

XIII. Isolation and SRV removal procedures

A. Isolation reverification

1. Complete the changeover so the alternate SRV is active.
2. Verify indicator position and flow-path identification.
3. Confirm the active SRV and discharge path are available.

B. Depressurization through the bleed valve

1. Wear PPE appropriate for the process fluid and anticipated temperature.
2. Connect the bleed outlet to an approved closed drain, flare, recovery, or collection system when required.
3. Stand clear of the bleed outlet.
4. Open the isolated-flow-path bleed valve slowly.
5. Allow pressure to decay fully.
6. Verify zero pressure using site-approved means.
7. If pressure does not decay or re-accumulates, close the bleed valve if safe to do so and discontinue removal. Treat the isolation as unsuccessful.

⚠ WARNING

Do not perform maintenance on the valve while in service. Valve must be isolated from the system pressure before performing any maintenance. If not properly isolated from the system pressure, the valve may inadvertently vent resulting in serious injury.

C. SRV removal

1. Apply the site line-breaking and lifting procedure.
2. Disconnect discharge piping without transferring excessive load to the SafeSwitch.
3. Loosen fasteners cautiously while maintaining personnel clear of the joint.
4. Remove the SRV using approved lifting equipment.
5. Protect the exposed SafeSwitch outlet from contamination and damage.
6. Inspect the flange face, studs, gasket area, and flow-path cavity.

D. Replacement SRV installation and return to service

1. Verify replacement SRV identity, set pressure, materials, and service suitability.
2. Install a new gasket or seal of the specified type.
3. Install and tighten fasteners per the released site specification.
4. Reconnect and support discharge piping.
5. Close the flow-path bleed valve.
6. Perform the specified external leakage check.
7. Keep the replacement flow path as non-active or transfer it to active service.

⚠ DANGER

A flow path that will not depressurize or that re-pressurizes is not isolated. Do not loosen the SRV connection.

XIV. Periodic inspection and preventive maintenance

A. Maintenance basis

Inspection frequency shall be established by the site owner based on service severity, fluid cleanliness, corrosion rate, cycling frequency, regulatory requirements, and operating history. Increase inspection frequency when the service contains solids, polymerizing fluids, corrosive media, or deposits that could affect seats, bleed valves, or indicator hex movement.

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B. In-service inspection

Inspection point	Check
Body and closures	External corrosion, deformation, leakage, damaged coating
Stem area	External leakage, corrosion, packing condition
Indicator and linkage	Position, damage, looseness, interference
Bleed valves	Cap/plug condition, external leakage, operability
SRV connections	Leakage, flange condition, abnormal piping loads
Ball plug travel	Smooth operation to both positive stops during an approved changeover

C. Maintenance records

Record each changeover, leak observation, torque concern, bleed-valve use, SRV removal, repair, replacement part, and test result by valve serial number.

XV. COV disassembly

⚠ WARNING

The SafeSwitch base must be isolated from all pressure sources, depressurized, drained, decontaminated, and verified safe before disassembly.

A. Preparation

1. Obtain the released assembly drawing, BOM, service kit, special tools, and torque specification for the serial number.
2. Remove the complete assembly from service using the approved site isolation plan.
3. Verify zero pressure at the inlet and both outlet flow paths.
4. Drain and decontaminate all cavities.
5. Mark indicator, stem, ball plug, seats, and body orientation for reference.
6. Place the valve on a clean work surface with suitable supports.

B. General disassembly sequence

1. Remove the indicator pin (27) and indicator hex (26), or disconnect the tandem linkage in accordance with the released linkage procedure.
2. Unthread and remove the cap (25) from the driving nut (23).
3. Remove the ball bearings (24) from the driving nut and stem groove. Account for all bearings.
4. Turn the driving nut (23) counterclockwise and remove it from the yoke (20).
5. Remove the actuation nuts (22), lift the yoke (20) from the actuation studs, and remove the actuation studs (21) from the base (1), if required.
6. Loosen and remove the packing nuts (14) evenly. Remove the packing flange (8), packing follower (9), four or five packing split rings (10), and guide (5), keeping the parts in removal order.
7. Remove the packing studs (13) from the base (1), if required.
8. Turn the valve over and support the base and inlet base securely for separation.
9. Loosen the base nuts (12) gradually in a crisscross pattern and remove the nuts and base studs (11). Do not use the assembly torque as a breakaway-torque limit.
10. Lift the inlet base (2) straight from the base (1) without damaging the mating faces or stop pin (16).
11. Remove and discard the spiral-wound gasket (15).
12. Withdraw the stem-and-ball-plug assembly from the base (1) using the orientation marks. Protect all sealing, bearing, and machined surfaces.
13. Unthread and remove the seat bushings (4) from the base (1) using the approved tool (see Figure 2). Retain orientation identification and remove residual sealant without damaging the threads or seating faces.
14. Remove the stem ring (7) from the ball plug (3).
15. Withdraw the stem (6) from the ball plug (3).
16. Tag and protect reusable metal parts. Discard the spiral-wound gasket, packing rings, O-rings, and other mandatory-replacement soft goods in accordance with the released service specification.

Note: Exact disassembly order, special tooling, and retention methods may vary by size and pressure class.

XVI. Cleaning and inspection

A. Cleaning

- Use cleaning agents compatible with the component materials and prior process service
- Remove deposits without rounding edges or damaging machined sealing surfaces
- Clean bleed passages using approved non-damaging methods
- Do not use wire brushes, blasting media, or abrasives on precision sealing surfaces unless permitted by the repair specification
- After cleaning, dry parts and protect machined surfaces from corrosion and contamination

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B. Inspection criteria

Component	Inspect for
Base/closures	Cracks, washout, corrosion, pitting, thread damage, flange damage, distortion
Ball plug	Scoring, erosion, corrosion, deposits,impact marks, dimensional wear
Seats/retainers	Cuts, indentation, erosion, looseness, damaged sealing edges
Stem	Bending, galling, corrosion, thread damage, bearing wear
Bearings/bushings	Wear, scoring, seizure, loss of fit
Seals/packing	Cuts, flattening, embrittlement, swelling, extrusion
Indicator hex/stops	Damage, looseness, wear, misalignment
Bleed valves	Seat damage, blockage, stem leakage, damaged threads

C. Disposition

Replace parts that do not meet the released repair criteria. Do not weld-repair, metal-spray, plate, machine, or locally heat pressure-containing or critical trim components unless an approved Baker Hughes repair procedure authorizes the work.

XVII. COV reassembly

A. General requirements

- Work in a clean area and prevent lint, chips, grit, or abrasive residue from entering the valve
- Use genuine specified replacement parts and new mandatory-replacement seals
- Confirm material and part number against the released BOM
- Use only approved lubricants and sealants, and keep them off process sealing surfaces unless directed
- Observe orientation marks and the released assembly sequence

B. Lubricant and sealants

1. Operating temperatures between -20°F and +550°F (-28.8°C and +287.7°C)
   a. Recommended joint sealant compound are Hylomar SQ 32 or equivalent.
   b. Lubricate standard threads with nickel graphite N5000 (P/N 4114507) or Jet-Lube 550, Baker Hughes non-metallic (P/N 4114511).
   c. Lubricate bearing points with molykote 33 Extreme (P/N SP505).
2. Operating temperatures between -450°F and -21°F (-268°C and -29.4°C)
   a. Recommended joint sealant compound are Crown No. 9008 Teflon Spray, Never-Seez with Teflon, or Rodorsil CAF 730.
   b. Lubricate standard threads with nickel graphite N5000 (P/N 4114507) or Jet-Lube 550, Baker Hughes non-metallic (P/N 4114511).
   c. Lubricate bearing points with molykote 33 Extreme (P/N SP505).
3. Operating temperatures above +551°F (+288.3°C)
   a. Recommended joint sealant compound are Silver Seal T-J, Turbo 50, or Hylomar SQ 32.
   b. Lubricate standard threads with nickel graphite N5000 (P/N 4114507) or equivalent.
   c. Lubricate bearing points with molykote 33 Extreme (P/N SP505).

C. General reassembly sequence

1. Insert the stem (6) into the ball plug (3).
2. Lubricate and install the stem ring (7), then tighten it to the ball plug (3). Mark the top of the stem to indicate the internal ball-plug position after final assembly.
3. Apply joint sealant compound to the bottom face of each seat bushing (4). Lubricate the internal body threads, then thread the seat bushings into the base (1).
4. Tighten the seat bushings (4) firmly in the base (1). See Figure 2 for seat tightening tool.
5. Install the stem-and-ball-plug assembly into the base (1) in the marked orientation.
6. Place a new spiral-wound gasket (15) on the base (1), then install the inlet base (2). Align the stop pin (16) with the corresponding hole in the base.
7. Lubricate the base studs (11) and base nuts (12).
8. Tighten the base nuts in a crisscross pattern in three torque increments. Refer Table 1 for torque values.
9. Turn the valve over and support it securely in the assembly position.
10. Lubricate and install the packing studs (13) in the base (1).
11. Install the guide (5), four or five packing split rings (10), packing follower (9), and packing flange (8), in that order. Install and tighten the packing nuts (14) in accordance with the released specification.
12. Before assembling the actuation components, verify that the ball-plug assembly is resting on the inlet base (2).
13. Lubricate the actuation studs (21) and install them in the base (1).

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14. Install the yoke (20) over the actuation studs and secure it with the actuation nuts (22).
15. Lubricate the yoke threads. Turn the driving nut (23) clockwise onto the yoke until it bottoms out or aligns with the stem ball-bearing groove.
16. Lubricate and install ball bearings (24) through the driving nut (23) and verify that they are fully seated in the stem groove.
17. Lubricate the cap (25) threads and thread the cap into the driving nut (23).
18. Install the indicator hex (26) and indicator pin (27) in the marked orientation.
19. Verify that the driving nut moves freely along the yoke threads and that the ball plug retracts, rotates through its permitted 180° travel to the stop pin, and engages the opposite seat without binding. Do not force rotation against the stop pin.

D. Torque values

Table 1—Torque values for base nuts

COV size (in.)	Flange rating	Required torque (ft-lb)
0.75	150	105
	300	175
	600	175
	900	650
	1500	650
1	150	105
	300	175
	600	175
	900	650
	1500	650
1.5	150	90
	300	325
	600	325
	900	750
	1500	750
2	150	150
	300	150
	600	300
	900	1070
	1500	1070
3	150	230
	300	245
	600	630
	900	1050
4	150	260
	300	275
	600	715
6	150	380
	300	335
	600	955
8	150	420
	300	510
10	150	415
	300	750

XVIII. Functional testing and return to service

A. Test prerequisites

Testing shall be performed using released Baker Hughes procedures, suitable test equipment, calibrated instruments, appropriate barriers, and a fluid compatible with the valve materials and cleanliness requirements.

B. Required verification

Test	Objective
Indicator hex travel	Confirm smooth movement between positive stops
Indicator alignment	Confirm indication agrees with selected path
External leakage	Check body, closures, stem, and bleed valves
Internal seat leakage (per API 527)	Check isolation of each flow path

C. Return-to-service checklist

- Test results accepted and documented
- Temporary test fittings removed
- Bleed valves closed and correctly capped/routed
- Indicator aligned
- Indicator and stops secured
- Correct start-up flow path selected
- Flange protectors removed only at installation
- Maintenance record updated

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XIX. Troubleshooting guide

Condition	Possible cause	Recommended action
High or uneven operating torque	Pressure imbalance, debris, corrosion, linkage interference, bearing damage	Do not force. Verify conditions, isolate as required, inspect indicator and internals
Cannot reach positive stop	Obstruction, stop misadjustment, ball/seat damage, tandem misalignment	Maintain relief protection and inspect using IOM
Non-active SRV seat leakage	SafeSwitch seat leakage on the isolated side	Isolate SafeSwitch and repair per released IOM
Isolated flow path will not depressurize	Seat leakage, wrong flow path selected, bleed blockage, indicator misalignment	Do not remove SRV. Re-verify position and investigate isolation
External leakage at stem	Worn/damaged packing or seal, stem damage, loose gland/retainer	Isolate SafeSwitch and repair per released IOM
Leakage at bleed valve	Debris, seat damage, loose connection, damaged seal	Route leakage safely, isolate and repair
Indicator disagrees with flow path	Loose/misindexed indicator, damaged linkage or key	Do not rely on indication, verify mechanically and correct alignment

Note: IOM stands for installation, operation, and maintenance manual.

XX. Replacement parts planning

A. Basic guidelines

The following guidelines should be of assistance in developing a meaningful replacement parts plan.

1. The total number of valves in service should be classified by size, type and temperature class.
2. The parts inventory should be classified by the tendency to require replacement.
   Class I— Most frequently replaced
   Class II— Less frequently replaced but critical in an emergency
3. Parts for the valve types covered by this manual are classified on Table 2.
4. When ordering replacement parts, please specify in accordance with applicable nomenclature. Be sure to state the size, type and serial number of the valve for which parts are required. For ease of maintenance O-ring kits are available for each main valve and pilot type. A stock of these kits should be kept on hand for maximum operating efficiency.

B. Identification and ordering essentials

When ordering service parts, please furnish the following information to ensure receiving the correct replacement parts.

Identify valve by the following nameplate data (refer Figure 1):

A. Size

B. Pressure/Temperature Class Rating

C. Serial Number

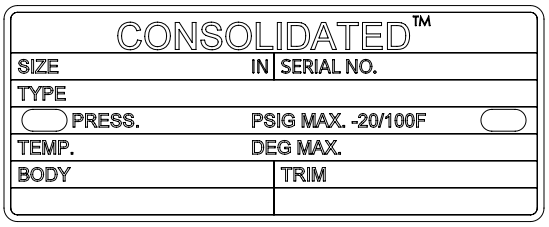


Figure 1—Consolidated™ 5500 Series SafeSwitch™ changeover valve identification nameplate

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C. Recommended spare parts

Table 2—Recommended spare parts for 5500 Series COV[1]			
Category	**Parts**	**Category**	
Soft goods	Seat seals	I	Class I parts should be stocked at the rate of one (1) per valve. Maintaining this level of spare parts will provide replacement parts for 70% of possible maintenance requirements
	Stem seals/packing		
	Inlet base/base gasket		
Seat rings	Seat bushings	II	Class II parts should be stocked at the rate of one (1) part per each five (5) valves in the population. Class II parts will provide replacement parts for an additional 15% of possible maintenance requirements.
Ball plug	Ball plug		

Note:

1. A combination of Class I and II parts will satisfy maintenance requirements 85% of the time.

XXI. Technical data

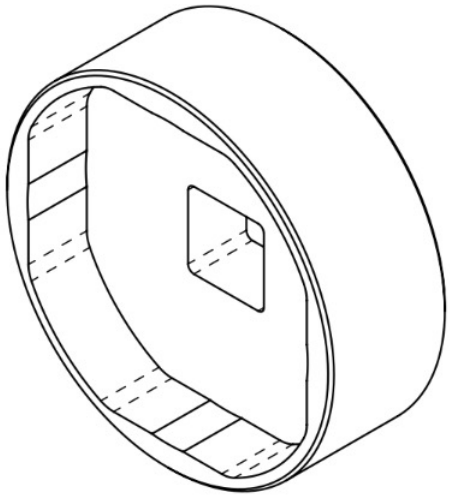


Figure 2—Seat tightening tool

Table 3—Seat tightening tool part numbers	
Size (in.)	**Seat tightening tool part number**
0.75/1	7938101
1.5	7938201
2	7938301
3	7938401
4	7938501
6	7938601
8/10	7938701

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XXII. Appendices

Appendix A. Changeover log

Date/time	Unit/tag	From	To	Operator	Observations

Appendix B. Preventive maintenance checklist

Check	Accept	Repair/note
Nameplate legible	☐	
Base and closures free of external leakage	☐	
Stem area free of leakage	☐	
Bleed valves secure and operable	☐	
Indicator aligned and legible	☐	
Indicator hex and linkage undamaged	☐	
Travel smooth to both positive stops	☐	
SRV and piping supports acceptable	☐	
Maintenance record updated	☐	

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Notes

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Notes

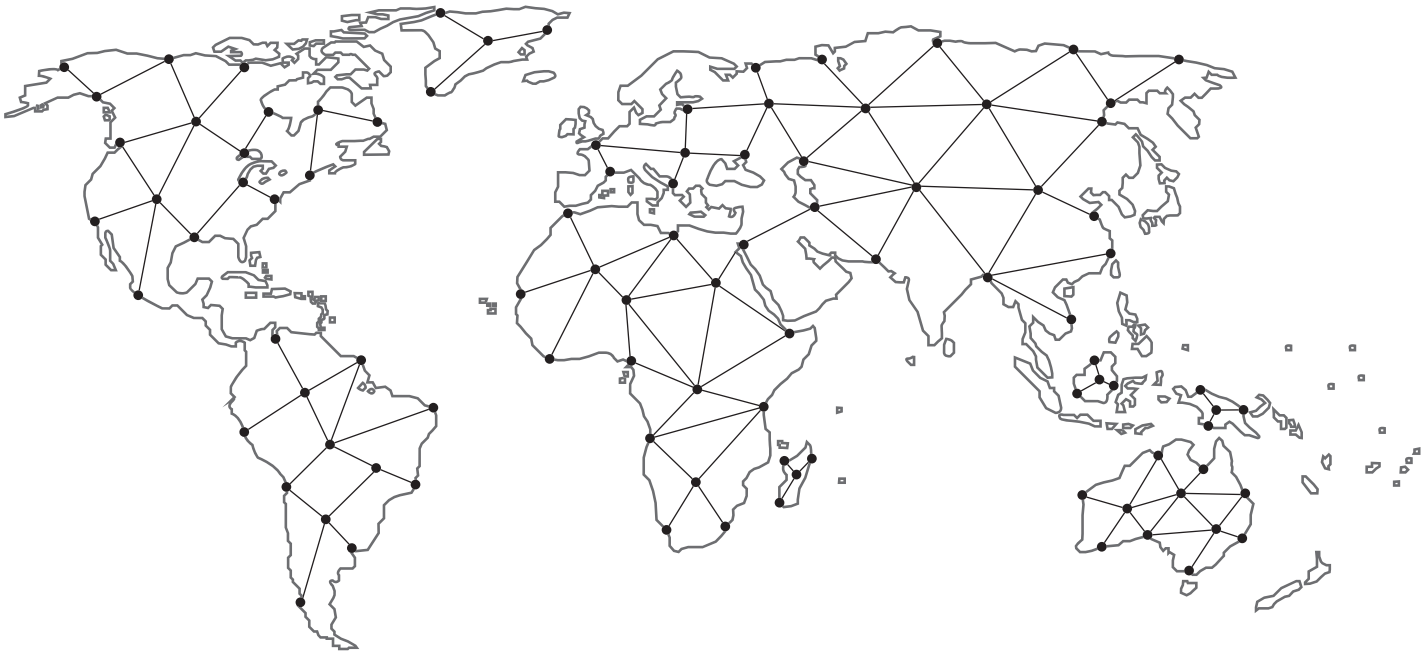
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Notes

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