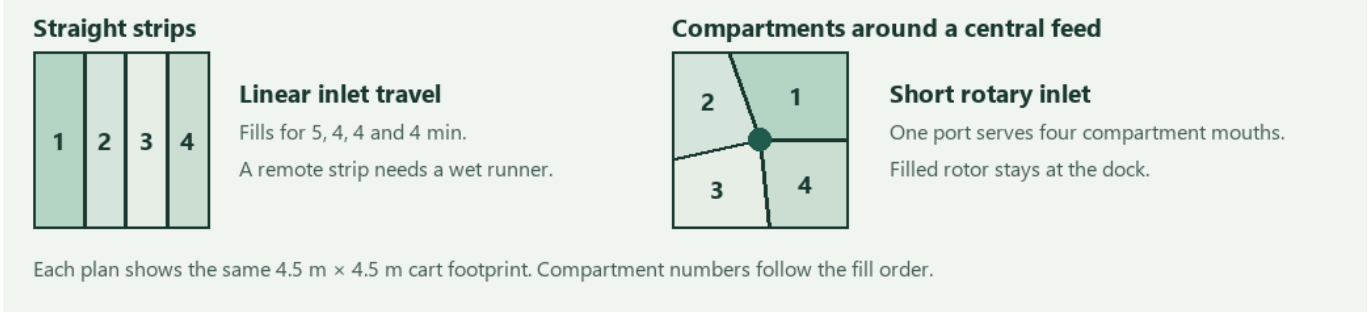
Four-strip buyer receiver

A buyer-side mechanical follower compares oil entering the original inlet with oil rising in the receiving cart. Its purpose is to stop an unexpected diversion automatically while allowing genuine delivery to an intact buyer.

Decision

The broad tank admitted 21.409 L after both buyers failed. Four strips and a seller-side bellows reduced the local result to 10.980 L. The compact four-sector feed with its connecting elbow admitted 11.676 L. Both weight readings stayed falsely healthy and neither buyer retained oil. All 20 complete missions remain unverified.

How oil reaches the four compartments



Each plan shows the same 4.5 m × 4.5 m cart footprint. Compartment numbers follow the fill order.

Fill one compartment at a time

The 4.5 m square buyer cart fills four final compartments for 5, 4, 4 and 4 minutes. The selector changes compartment only in dry intervals after minutes 5, 9 and 13. Full compartments close. The straight-strip layout and the compact radial layout keep the same buyer inlet.

Trip on missing liquid

A mechanical follower rides on the active strip. Its smaller surface gives greater vertical movement for each litre received. At the test onset, the five-minute strip commanded closure after 39.75 ms. The seat took another 80 ms to move. A 12 L spring bellows per seller accepted oil upstream during that movement.

Read the three volumes separately

In the local straight-strip test, 5.679 reference L crossed both inlets before the command and 5.301 L afterward. The seller-side bellows separately received 2.778 hot L. The model converts 1.05 hot L to one reference litre. Oil escaping the site requires its own boundary measurement.

Why a sudden flowing loss still passes oil

At 400 reference m^3/h, a required minute contains at least 400/60 m^3. Divide that minute into 3,000 intervals of 20 ms. At least one contains 2.222 L or more. If both buyers fail at the start of that interval and the inlet flow remains unchanged for 20 ms, at least that much crosses. At the tested 75 hot L/s per buyer, 20 ms carries 2.857 reference L. Advance closure can achieve zero during a mechanically controlled disconnect.

Healthy operation has a minimum tolerance

At 75 hot L/s into the 4.758 m^2 strip, a 15 ms lag plus 0.10 mm position error implies 0.336 mm apparent mismatch, below the 0.40 mm trip threshold. At 40 ms, the same calculation gives 0.730 mm. The healthy-flow trial then tripped.

What the model found

Each comparison below uses the original buyer inlet. Volumes crossing after failure count immediately, even when oil is subsequently captured inside the installation.

Same flow, same unannounced loss

The broad cart admitted 21.409 L, the four strips with the original nozzle admitted 13.587 L, and adding the finite bellows gave 10.980 L. The finer time step gave 10.980 L. These are paired reference litres for the single tested onset.

Compact feed with its inlet elbow

A 0.32 m rotary port at the center of four sectors includes the elbow loss factor of 1.5 and the moving oil in the port. Paired crossing was 11.675647 L, or 11.675815 L on a finer time step. The seller bellows separately caught 2.718 hot L. The full-loss run credited zero genuine retention.

A restricted seller-side catch

With the bellows diversion delayed 40 ms, 13.423 L crossed. A bellows limited to 1 L per seller gave 11.332 L. A blocked branch returns the original-nozzle result of 13.587 L. Keeping the source at full rate until the seat closed gave 12.054 L.

Timing and false readings

Charging full forward flow through seat travel and each 5 L pressure pocket gave an upper bound of 26.67 L over 240 sampled full-loss start phases. When the physical follower itself moved as if the buyer were filling, 1,437.143 L crossed. A 1 mm slosh control also tripped a healthy cart.

A small hidden bypass

At 1% diversion, the trip took 2.481 s. Up to 375.31 L crossed in the conservative calculation, including up to 3.7531 L diverted. The rest reached the buyer in this partial-loss control.

Oil crossing both original inlets after failure



Paired reference litres in the same simulated total loss. All four bars begin at zero.

Installing the receiver

The 2.25 m straight runner needs 9.136 kPa additional pressure and is short by 7.175 kPa. That layout cannot inherit the successful delivery replay. Bringing four sectors together around a short rotary port keeps 0.182 kPa in the modeled pressure budget.

Narrow pressure margin

The central port has 0.25 m^2 flow area over 0.32 m. Restricting its aperture to 0.15 m^2 leaves a 0.701 kPa deficit. Measured bend losses, wet switching and available inlet pressure could consume the rated margin.

Partition support and trip accuracy

One missing tie in the straight cart demands 44.57 kN against 40.72 kN. The compact frame uses 70.1% of assumed tube capacity. If its 0.760 mm motion appears as equal follower error, one sign falsely trips a healthy cart. The other delays the trip to 92.25 ms and admits 19.175647 L. Staying within 0.10 mm requires rejecting at least 86.842% of that motion. This has not been demonstrated.

Exchange, energy and fill height

Peak modeled level is 3.052 m inside a 3.35 m cart. Including lifts and resets, 87.239 kWh is charged against 89.6 kWh. Overlapping under-deck reset and cart exchange takes 11.40 s in a 12.384 s dry window. Sequential operation takes 18.158 s and misses the window. The interlock enabling overlap still needs a loaded test.

Surface cleanliness and site release

The compact cart adds 92,198.4 m^2 across both fleets. At 2 µg/m^2 oil and 4 µg/m^2 moisture, the modeled paired trace charges are 0.999798307 L exterior oil and 0.698479976 L water in one hour. These totals assume bulk oil stays contained. The appearance of any exterior oil requires a separate measured pathway.

The filled rotor is additional inventory

Each reusable rotor contains 80 hot L. Both installed rotor charges together represent 152.381 reference L at risk if their seals fail. These existing charges are separate from new inlet crossing. A sealed rotor retains 0.814 reference m^3 source reserve per buyer. Dumping a rotor at each change produces a 18.615 m^3 deficit.

Physical acceptance test

Use a closed test loop with independent collection at the original buyer inlet and the site boundary. Repeat losses throughout a delivery stroke, recording genuine retained mass, follower error, pressure and seat leakage. Unevenly fill the sectors, obstruct the central port and require sequential exchange. These measurements determine whether the modeled transfer and flow limits hold in hardware.

The twenty registered incidents

With eight piston pairs down per train, minimum genuine paired flow was 400.156516 m³/h in the base system, 400.150773 m³/h in the strip replay and 400.150794 m³/h in the compact-hub replay. Across 175,680 required minutes, all 27,152 delivered portions met modeled quality limits. Both receiver replays require intact storage, successful switching and adequate inlet pressure. The long straight runner fails this pressure condition. The 40% target is 400 m³/h.

ID	Registered incident	Duty	Base[1]	Strip[1]	Hub[1]	Full case
01	Source closing energy lost and conventional valves jammed	0 h	—	—	—	Unverified
02	Terminal closing energy lost and conventional valves jammed	0 h	—	—	—	Unverified
03	Source and terminal closing energy lost with jammed conventional valves	0 h	—	—	—	Unverified
04	Trigger inlets blocked with jammed conventional valves	0 h	—	—	—	Unverified
05	Pilots blocked with jammed conventional valves	0 h	—	—	—	Unverified
06	Sleeves torn with jammed conventional valves	0 h	—	—	—	Unverified
07	Sleeve closing force tripled with jammed conventional valves	0 h	—	—	—	Unverified
08	5 mm² seat gaps with jammed conventional valves	0 h	—	—	—	Unverified
09	Three route boundaries lost	72 h	400.156516	400.150773	400.150794	Unverified
10	Independent heat envelope penetrated	72 h	400.156516	400.150773	400.150794	Unverified
11	Closed catch boundary lost	0 h	—	—	—	Unverified
12	Loaded collapse and outer-vault loss at 60 h	60 h	400.156516	400.150773	400.150794	Unverified
13	100 mm source-gas wall breach	72 h	400.156516	400.150773	400.150794	Unverified
14	Gas heat transfer degraded	72 h	400.156516	400.150773	400.150794	Unverified
15	Catch heat transfer reduced at 60 h	60 h	400.156516	400.150773	400.150794	Unverified
16	Local pocket outer boundary lost	72 h	400.156516	400.150773	400.150794	Unverified
17	Catch heat transfer lost at 60 h	60 h	400.156516	400.150773	400.150794	Unverified
18	Enclosure gas starts at 86 °C	60 h	400.156516	400.150773	400.150794	Unverified
19	Catcher shield fully open	60 h	400.156516	400.150773	400.150794	Unverified
20	All current quality evidence falsified	72 h	400.156516	400.150773	400.150794	Unverified

[1] Minimum genuine paired delivery in each required minute, in reference m³/h. A dash indicates that immediate isolation was required. Each incident requires containment to hour 72.

The private panel contains the buyer receiver test film, its experiment data and the full system study with case-by-case evidence. The full film runs 37:29.250. The buyer chapter begins at 36:24.500.

Buyer test film **Full system film** **Experiment data** **Full system panel**