

FOR SPECIFYING AND PURCHASING ENGINEERS

Custody transfer meter runs

Complete orifice meter runs to AGA Report No. 3 and ISO 5167 · NPS 2" – 44" · ASME Class 150 – 2500

SIZE RANGE	DESIGN CODES	BORE FINISH
NPS 2" – 44"	AGA-3 · ISO 5167	Measured and recorded

1. Product and variants

A complete measurement spool built and documented as one item: upstream straight length, flow conditioning, the primary element, downstream length and matched flanged ends. The straight run is machined and verified in the shop rather than assumed on site, which is where most installed uncertainty is lost.

All three runs are built the same way, as upstream, element and downstream spools. What changes is how the plate is held — and that decides whether a plate change needs a shutdown, a local outage, or nothing at all. The bore is measured after fabrication, and the measured diameter is used in the flow calculation.



Orifice Plate Meter Run

PLATE BETWEEN ORIFICE FLANGES

Plate mounted between orifice flanges with inlet and outlet spools welded either side. No moving parts in the run. A plate change means shutting down and breaking the flange.



Single Chamber Fitting Run

LOCAL OUTAGE TO CHANGE A PLATE

Single chamber fitting welded into a complete run with conditioning and matched pipe sections. The plate comes out through the top once the line section is isolated and depressurised and the clamp bar is removed.



Dual Chamber Fitting Run

PLATE CHANGE UNDER PRESSURE

Dual chamber fitting welded into the run, keeping plate access live. The line stays in service at full pressure while the plate is withdrawn through the upper chamber.

2. Technical data

PROPERTY	VALUE
SIZE RANGE	Orifice plate meter run NPS 2" – 44" (DN 50 – DN 1100); dual and single chamber fitting runs NPS 2" – 24" (DN 50 – DN 600), higher sizes on request. ISO 5167-2 covers bores from 50 mm to 1000 mm (5.3.1); larger runs, NPS 2" Sch 80 and heavier (D < 50 mm), and fitting runs whose AGA-3 tap holes exceed its limit (INK-DS-02) are built to AGA-3.
PRESSURE CLASS	ASME Class 150 – 600 standard; up to Class 2500 special production to NPS 12"; fitting runs NPS 14" – 24" up to Class 1500

PROPERTY	VALUE
DESIGN CODES	AGA Report No. 3 (Part 2: 5th edition, 2016); ISO 5167-1 and -2:2022
PRESSURE DESIGN	ASME B31.3, B31.8 or B31.1, as specified; PED where it applies
STRAIGHT LENGTHS	Per AGA-3 / ISO 5167-2, or shortened with a conditioner — İnkotek layouts in Section 4
FLOW CONDITIONING	Zanker, NEL (Spearman), Laws, tube bundle; the Laws plate is made to the K-Lab NOVA geometry given in ISO 5167-2, Annex B
TUBE BORE TOLERANCE	Machined and recorded; four diameters measured in each cross-section, as ISO 5167-2:2022, 6.4.2 and ISO/TR 9464 describe. Limits: AGA-3 Part 2, 5.1.3; ISO 5167-2:2022, 6.4
INTERNAL SURFACE FINISH	Bore honed or machined to an Ra inside both the upper and the lower limit for the line size and beta ratio in use: AGA-3 Part 2, 5.1.1.1 (never below 0.86 µm); ISO 5167-2:2022, 5.3.1, Tables 1 and 2 (10D upstream of the plate). Machined or honed length: the fitting spool, conditioner to plate, on ISO 5167 runs; the whole run on AGA-3 runs
END CONNECTIONS	Flanged to ASME B16.5 / B16.47 with RF, RTJ or groove type facing; butt weld ends to ASME B16.25; special end connections on request
MEASURING UNCERTAINTY	Set by the element in the run and by compliance with the straight-run and bore requirements; stated on the calculation sheet for the duty

3. Materials

A custody transfer run is qualified as one package, so every pressure part is specified to the same minimum design temperature and rating.

PART	MATERIAL	NOTE
SPOOLS	A106 Gr B carbon as standard; A333 Gr 6 for low temperature. EN grade for PED: P265GH	A333 Gr 6, impact tested, where the minimum design temperature calls for it. Other grades on request.
FLANGES	A105N carbon as standard; A350 LF2 for low temperature. EN grade for PED: P250GH	On a low temperature run the flanges are matched to the spools, so no single joint sets a higher minimum temperature than the rest of the package.
FITTING BODY	A216 WCB casting as standard; LCB-equivalent cast steel for low temperature service; other grades on request. EN grade for PED: GP240GH	Matched to the spools and flanges, so the fitting and the run are qualified together.
PLATE, CONDITIONER & INTERNALS	316 / 316L stainless steel; conditioner plates also in galvanised, chrome-plated or nickel-plated carbon steel	Orifice plate stainless, never carbon steel: 316L in fittings (INK-DS-02), 316 / 316L or 304 / 304L in flange unions (INK-DS-01). Orifice plate and 19-tube bundle to the AGA-3 / ISO 5167 tolerances; conditioner plates to the published geometry of their design.

4. Dimensions

A meter run has no catalogue length. Upstream and downstream lengths come out of the beta ratio and the fittings ahead of the run, per AGA-3 and ISO 5167-2; where the available space is shorter than the standard demands, a conditioner is placed at the qualified distance and the run is built around it.

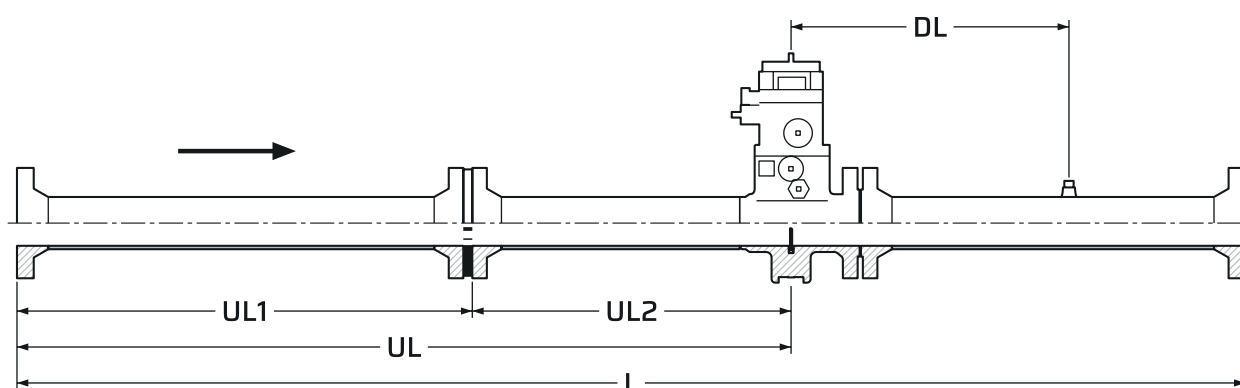


Figure 1 — Meter run layout. Dual chamber fitting run with a plate conditioner. Not to scale.

UL1	Inlet face to conditioner outlet (UL – UL2)	UL2	Conditioner outlet to orifice plate
UL	Upstream meter tube length, inlet face to orifice plate	DL	Downstream length, orifice plate to thermowell
L	Overall length, face to face		

CONDITIONER · BASIS	UL	UL2	UL1	DL
Laws plate · AGA-3 Part 2 performance test data	≥ 17D	7D	10D	6D
Laws plate · ISO 5167-2:2022, B.3.4	18D	9D	9D	6D
Zanker plate · ISO 5167-2:2022, 6.3.3.3	≥ 17D	7.5D	9.5D	6D
19-tube bundle · ISO 5167-2:2022, 6.3.2.2.2; AGA-3 Part 2, Table 8b	≥ 30D	13D	≥ 17D	6D
No conditioner · AGA-3 Part 2, Table 7; ISO 5167-2:2022, Table 3	By β and the upstream fitting			6D

Table 1 — Straight lengths in Inkotek layouts, as multiples of the meter tube bore D.

- ISO 5167-2 windows: Laws $8.5D \leq UL2 \leq UL - 7.5D$; Zanker $7.5D \leq UL2 \leq UL - 8.5D$. ISO conditioner layouts apply for $\beta \leq 0.67$.
- DL: 6D for $\beta \leq 0.50$, 7D for $\beta \leq 0.67$, 8D at $\beta 0.75$ without a conditioner (ISO 5167-2, Table 3, column 14; 2003 = 2022). AGA-3 Part 2 asks for 2.8D – 4.5D (Tables 7, 8a, 8b).
- DL ends at the thermowell: AGA-3 Part 2, 6.5 allows the tabulated DL to four times it, ISO 5167-1:2022, 5.4.4.1 5D – 15D in gas; 6D meets both.
- Tolerance on UL2 and DL: $\pm 0.25D$. The values follow from β and are stated on the calculation sheet for the duty; the approved project drawing governs.

5. Options and configuration

OPTION	CHOICES
ELEMENT IN THE RUN	Flange union, single chamber or dual chamber fitting
FLOW CONDITIONING	Zanker, NEL (Spearman), Laws, tube bundle, or none with the full straight length
TAPPINGS	Flange; corner or D and D/2 on ISO 5167 runs (AGA-3 covers flange tappings only). Flange and D and D/2 tap holes on ISO 5167 runs 4 – 12 mm by line size, inside the 5.2.2.7 limit; AGA-3 holes (9.53 mm on NPS 2" – 3", 12.7 mm from NPS 4") exceed it on NPS 2", NPS 3" Sch 160 and heavier and NPS 4" Sch 80 and heavier
THERMOWELL BOSSES	On the downstream spool: threadolts to MSS SP-97 or flanged; number, size and rating to the project

OPTION	CHOICES
SOUR SERVICE	Wetted metallic parts to NACE MR0175 / ISO 15156
INSPECTION	Witnessed and third-party inspection to the project specification

6. Quality control and documentation

ITEM	SCOPE
QUALITY SYSTEM	ISO 9001:2015; PED where it applies
WELDING	Qualified welding procedures
NDE	Project specification; İnkotek layouts: 100 % RT/UT of butt welds, 100 % PT/MT of fillet welds
PRESSURE TEST	Hydrostatic test, or pneumatic where the project specifies, to the project specification
BORE	Diameter, roundness and roughness measured and recorded
APPROVAL DRAWING	General arrangement, with support spacing and centreline height, approved before fabrication
MARKING	Tag number, job number, measured bore, flow direction and spool identification on each section; nameplate with serial number and flow-direction arrow
CERTIFICATES	Material certificates to EN 10204 3.1 / 3.2
DOCUMENTATION	Sizing calculation, bore measurement report, material certificates, welding and NDE records, pressure test report, dimensional report

7. What to send with an enquiry

PROCESS DATA	WHAT IT DECIDES
Line size, schedule and material	Sets the spool bore and the material of the whole run
Flange standard, rating and facing	Raised face or RTJ, and the end preparation if welded in
Element required in the run	Flange union, single chamber or dual chamber fitting
Medium, flow range, pressure and temperature	Sets β , the bore and the differential at each flow point
Overall length available	Decides whether a conditioner is needed to meet the straight-run rule
Upstream fittings and layout	Bends, valves and reducers each carry their own length requirement
Fiscal or custody transfer duty?	Decides whether AGA-3 applies alongside ISO 5167
Witnessed inspection required?	Sets the test and documentation scope, and the delivery time

Send the enquiry to info@inkotekenerji.com or through the enquiry form at inkotekenerji.com/en/contact/.

DOCUMENT CONTROL

Ranges are manufacturing capability and are not an offer. Final geometry, materials and documentation are governed by the approved project drawing and the contract.

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