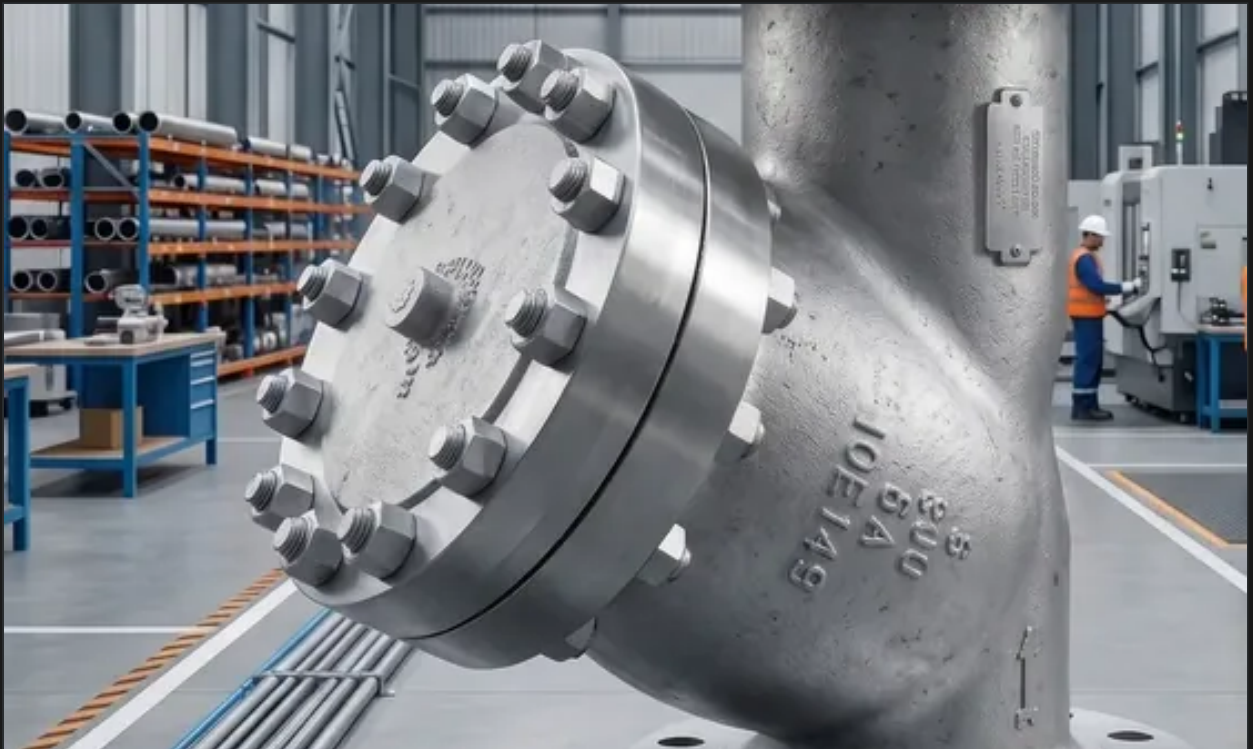


QUALITY ASSURANCE & QUALITY CONTROL

Engineering assurance from contract review to final release



ABOUT THIS DOCUMENT

This publication describes the quality assurance and quality control arrangements Hydrotherms applies to the design, procurement, manufacture, inspection, testing, documentation and release of industrial pipeline strainers. It is issued to customers, consultants, EPC contractors, third-party inspection agencies and end users as a statement of capability.

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REVISION HISTORY

Rev	Date	Description
0	August 2026	First issue. Supersedes the 2010 brochure in full.

STATUS OF THIS DOCUMENT

This is a customer-facing description of arrangements and capability. It does **not** replace the Hydrotherms Quality Manual, a project-specific Quality Assurance Plan (QAP), an Inspection and Test Plan (ITP), a customer specification, a purchase-order requirement or any contractual document. Where this document and an approved project document differ, the approved project document governs.

HOW TO READ THE WORDING

Activities described as performed **when specified in the approved ITP** are capabilities offered against project requirements, not operations carried out on every order. Activities described as **standard** are applied to all products within the stated scope unless the purchase order says otherwise. This distinction is deliberate: it lets an inspection agency see exactly what is contracted and what is optional.

SCOPE OF PRODUCTS

Industrial pipeline strainers — Y, simplex basket, duplex, tee, automatic self-cleaning, conical, wafer and suction diffuser — in cast and fabricated construction, together with their straining elements and accessories.

01 QUALITY COMMITMENT

A strainer is a pressure-containing component. What matters to the buyer is not that it was made carefully, but that it can be shown to have been. Hydrotherms is organised so that conformity is planned before work starts, verified while it proceeds, and evidenced in records that outlive the order.

Prevention before inspection

Inspection detects; it does not create conformity. The controls that matter most are applied before metal is cut — specification review, design verification, supplier approval, qualified procedures and qualified people. Inspection then confirms that what was planned was achieved.

Authority of the quality function

Quality personnel have the authority to stop work, reject material and withhold release, independently of production schedule pressure. That authority is meaningful only if it is exercised, and its exercise is recorded.

Traceability as evidence

Material identity is established at receipt and carried through cutting, fabrication and final assembly. A strainer that cannot be traced to its certified material has not been manufactured to specification, however sound it looks.

Continual improvement

Nonconformities, customer feedback and audit findings are treated as data. Root causes are investigated and corrective actions verified for effectiveness, so that the same fault is not re-inspected out of the product a second time.

ON ZERO DEFECTS

Zero defects is an organisational objective pursued through prevention, control, verification and improvement. It is not offered as a guarantee, and no manufacturer can honestly offer it as one. What Hydrotherms undertakes is that the specified controls are applied, that the specified verification is performed, and that the results are recorded and available for review.

02 QUALITY ASSURANCE AND QUALITY CONTROL

The two terms are routinely used interchangeably in enquiries and are not interchangeable. The distinction decides who is responsible for what, and when.

QUALITY ASSURANCE – THE SYSTEM

Planned, preventive, system-wide

The arrangements that make conformity likely before work begins: procedures, responsibilities, qualifications, planning and review.

- Documented procedures and their control
- Defined responsibility and authority
- Contract and specification review
- Design and change control
- Supplier approval and purchase control
- Qualification of procedures and personnel
- Audit, calibration and training programmes
- Corrective and preventive action

Asks: is the system capable of producing a conforming product?

QUALITY CONTROL – THE VERIFICATION

Applied, detective, product-specific

The examinations and measurements that confirm a particular item conforms, performed at defined points against defined acceptance criteria.

- Incoming material inspection and identification
- Dimensional and fit-up inspection
- In-process and final visual inspection
- Non-destructive examination
- Pressure and leak testing
- Coating and preservation checks
- Documentation review before release
- Control of nonconforming product

Asks: does *this* item conform to *this* specification?

Both are required. A sound system without verification produces unproven product; verification without a system produces inspection findings that recur. Hydrotherms operates the two together, with quality assurance defining the controls in the QAP and quality control executing and recording them against the ITP.

03 PROJECT QUALITY LIFECYCLE

Eleven controlled stages from enquiry to dispatch. Each has defined inputs, a defined verification, and a record. Work does not pass a stage until the preceding record is complete.

01 Enquiry & Specification Review Technical requirements, codes, and any deviation identified before offer.	02 Contract Review Purchase order, QAP, ITP, documentation and inspection requirements agreed.	03 Design & Engineering Calculations, GA and fabrication drawings, bill of materials, datasheet.	04 Supplier & Material Control Approved suppliers, purchase specifications, certified material.
05 Manufacturing Planning Route card raised, inspection points and hold points set against the ITP.	06 Fabrication & Welding Qualified procedures and welders, consumable control, in-process checks.	07 Inspection & NDE Examination to the extent and acceptance criteria the ITP defines.	08 Pressure & Functional Testing Test parameters taken from the governing code and approved procedure.
09 Final Inspection Configuration, dimensions, nameplate, cleanliness, coating, accessories.	10 Manufacturing Record Book Records compiled, reviewed and submitted for acceptance.	11 Preservation & Dispatch Protection, packing, release note and authorised release.	HOLD Customer & TPI Points Hold, witness, review and monitor points sit across stages 06 to 11.

HOLD POINTS

A hold point stops work until the nominated party has attended or waived attendance in writing. Hydrotherms gives advance notification against the period agreed in the ITP. Where a witness point is waived, the waiver is recorded and the activity proceeds with its normal documentation.

04 CONTRACT AND SPECIFICATION REVIEW

Every requirement that will later be inspected is identified before manufacture is authorised. Requirements discovered during fabrication are expensive; requirements discovered at final inspection are worse.

REVIEWED AT ENQUIRY AND AGAIN AT ORDER

- Purchase order and its technical attachments
- Project specification and piping material specification
- Governing design code and edition
- Customer QAP and ITP, including hold and witness points
- Material, certification and traceability requirements
- NDE extent, method and acceptance criteria
- Testing requirements and acceptance criteria
- Coating and preservation specification
- Documentation, marking and packing requirements
- Third-party inspection and statutory involvement

OUTPUT OF THE REVIEW

A confirmed technical scope, an agreed inspection and documentation plan, and a written record of every deviation, clarification or technical query raised.

DEVIATIONS ARE CLOSED BEFORE WORK STARTS

Where a requirement is unclear, self-conflicting or outside the offered scope, it is raised as a technical query and resolved in writing before manufacture is released. An unresolved deviation is not carried into production on the assumption it can be settled later.

WHERE REQUIREMENTS CONFLICT

An order of precedence is agreed at contract review – typically statutory requirement, then governing design code, then project specification, then purchase order, then Hydrotherms standard practice. The agreed order is recorded, so that later interpretation does not depend on anyone's memory.

05 DESIGN AND ENGINEERING CONTROL

Design outputs are controlled documents. What reaches the shop floor is the approved revision, and only the approved revision.

DESIGN INPUTS

- Process data – fluid, phase, flow, density, viscosity, solids
- Design and operating pressure and temperature
- Line size, schedule, end connection and rating
- Retention requirement and element specification
- Material, corrosion allowance and service conditions
- Governing code, statutory and client requirements

DESIGN OUTPUTS

- Design calculations for the pressure boundary
- General arrangement drawing
- Fabrication and straining-element drawings
- Bill of materials
- Equipment datasheet
- Welding and inspection requirements for the job

VERIFICATION AND RELEASE

Design outputs are checked against the design inputs before release. Calculations are reviewed by a competent person other than the originator. Where the contract requires customer approval of drawings, manufacture of the affected items is not released until approval, or approval with comment, is received.

CHANGE CONTROL

Changes after release are made by revision, never by annotation. Each revision carries a number, a description of what changed and a date. Superseded revisions are withdrawn from the shop, so that two versions of one drawing cannot be in use at the same time.

INDEPENDENT DESIGN VERIFICATION

Where a project requires design verification by a party independent of the design organisation – a notified body, or a reviewer appointed by the client – this is arranged as a project-specific activity. It is not implied as a standard service.

06 SUPPLIER AND MATERIAL QUALITY CONTROL

Material identity is the foundation of every later claim. A certificate that cannot be tied to the piece of steel in front of the inspector proves nothing.

Control	What is done	Applied
Approved suppliers	Pressure-boundary materials and outsourced special processes are procured from suppliers assessed and held on an approved list, with performance reviewed periodically.	STANDARD
Purchase specification	Purchase documents state material specification, grade, product form, dimensional standard, certification type and any supplementary requirement.	STANDARD
Material certification	Material test certificates to EN 10204 Type 3.1 are supplied as standard for pressure-boundary materials. Type 3.2, endorsed by an independent inspection body, is available where the project requires it.	3.1 STANDARD
Incoming inspection	Received material is checked for identity, marking, condition and dimensions, and for agreement between the certificate and the physical marking, before acceptance.	STANDARD
Positive material identification	Alloy verification by portable analyser, to the extent defined in the approved ITP.	WHEN SPECIFIED
Heat and batch traceability	Heat or batch number is recorded against the work order and carried on the route card through manufacture.	STANDARD
Identification transfer	Before any cut that would separate a piece from its marking, identification is transferred by an approved method, witnessed and recorded.	STANDARD
Welding consumables	Purchased to specification, stored under controlled conditions, issued against the applicable WPS, with unused material returned and accounted for.	STANDARD
Customer-supplied material	Received, verified, identified and stored separately. Damage, shortfall or nonconformity is reported to the customer before use.	WHEN APPLICABLE
Segregated storage	Materials are segregated by grade to prevent mixing, with stainless and carbon steel handled and stored apart to avoid iron contamination.	STANDARD

Sour service. ANSI/NACE MR0175 / ISO 15156 applies where the environment, the material and the equipment fall within the scope the standard defines, and where the contract invokes it. It is not a blanket requirement for every stream containing hydrogen sulphide. Material limits, hardness acceptance and any required testing are set at contract review and stated in the ITP.

07 MANUFACTURING AND PROCESS CONTROL

Each order travels with a route card carrying its identity, its operations and its inspection points. The card is the manufacturing record as it is being made, not a document assembled afterwards.

THE ROUTE CARD CARRIES

- Work order and serial or tag number
- Material identification and heat number
- Sequence of operations, in order
- Applicable drawing and revision
- Applicable welding procedure
- Inspection and hold points taken from the ITP
- Signature of the person performing each operation
- Signature of the inspector at each verification

IN-PROCESS VERIFICATION

- Material identity before cutting
- Dimensional check after machining
- Fit-up and joint preparation before welding
- Visual examination of welds
- Element opening, construction and fit
- Assembly, seating and cover joint

STATUS IDENTIFICATION

Inspection status is visible on the item or its location at all times – awaiting inspection, accepted, on hold, or nonconforming. Material whose status cannot be established is quarantined rather than assumed acceptable.

MEASURING AND TEST EQUIPMENT

Equipment used for acceptance decisions is uniquely identified, calibrated against traceable standards at defined intervals, and carries its calibration status. Equipment found out of calibration triggers a review of the measurements taken with it since the previous calibration.

HEAT TREATMENT

Where the material, the code or the specification requires solution annealing, stress relief or post-weld heat treatment, it is carried out to an approved procedure against a recorded time and temperature chart, which forms part of the record book.

RELEASE BETWEEN STAGES

An operation is not started until the preceding inspection has been signed. That sequence is what makes the record book a description of what happened rather than a reconstruction of it.

08 WELDING QUALITY MANAGEMENT

Welding is a special process: the result cannot be fully verified by examining the finished product, so the procedure and the person are qualified in advance and the conditions are controlled while the work is done.

Control	Basis
Welding Procedure Specification	A qualified WPS is issued for each joint configuration and material combination, and is available at the workstation where the joint is made.
Procedure Qualification Record	Each WPS is supported by a PQR recording the actual test-coupon variables and the results of the required mechanical testing.
Welder qualification	Welders and welding operators are qualified for the process, position and range in which they work, and continuity of qualification is maintained and recorded.
Qualification standard	Qualification to ASME BPVC Section IX , or to ISO 15614 and ISO 9606 where the project specification calls for the ISO route.
Consumable control	Consumables are issued against the applicable WPS, with low-hydrogen types handled and held to the conditions that procedure states.
Weld identification	Welds are identified to the welder who made them, so an examination result can be traced back to its source.
Preheat and interpass temperature	Monitored and recorded where the WPS specifies them.
Post-weld heat treatment	Performed to an approved procedure with a recorded chart, where the code, the material or the specification requires it.
Weld repair	Repairs are made to an approved repair procedure, recorded, and re-examined by the same method and to the same acceptance criteria as the original weld.

REPAIR IS RECORDED, NOT ABSORBED

A repaired weld is identified as repaired in the record book. Concealing repair history removes the customer's ability to assess the fabrication, and is treated as a nonconformity in its own right.

09 INSPECTION AND NON-DESTRUCTIVE EXAMINATION

Examination method, extent, technique, personnel qualification and acceptance criteria are set by the governing code, the approved procedure, the customer specification and the ITP – not by this document. What follows is the range of methods available and what each is for.

Examination	Purpose	Typical application	Performed
Visual (VT)	Surface condition, workmanship and dimensional conformity	Fabrication, welds, assembly and final inspection	Standard on all work; extent per ITP
Liquid penetrant (PT)	Surface-breaking discontinuities in non-porous materials	Welds, castings and machined surfaces	When specified in the approved ITP
Magnetic particle (MT)	Surface and near-surface discontinuities in ferromagnetic materials	Welds, forgings and castings	When specified in the approved ITP
Radiographic (RT)	Volumetric examination of welds and castings	Pressure-retaining welds and components	As required by the governing code or the specification
Ultrasonic (UT)	Internal discontinuities and thickness verification	Plate, forgings, welds and components	When specified in the approved ITP
Dimensional	Conformity to the approved drawing and the applicable dimensional standard	Machined faces, face-to-face, flange drilling, element fit	Standard, using calibrated equipment

PROCEDURES AND PERSONNEL

NDE is carried out to written procedures. Personnel are qualified and certified in accordance with a written practice based on **ASNT SNT-TC-1A** or **CP-189**, or to another scheme where the project specification requires it. Examination is performed by Hydrotherms personnel or by an approved external agency, according to the method and the project.

TECHNIQUE SELECTION

Radiographic technique, source and energy are selected by the approved procedure to achieve the sensitivity the acceptance standard requires for the thickness and geometry being examined. Fixed source-to-thickness rules are not applied in place of that judgement.

METHOD STANDARD AND ACCEPTANCE STANDARD ARE DIFFERENT THINGS

The method standard says how the examination is performed; the acceptance standard says what constitutes a defect. Both are stated separately in the ITP, because a single reference to a design code settles neither.

10 PRESSURE, LEAK AND PERFORMANCE TESTING

One test is standard. Everything else is carried out on request – by Hydrotherms, by a third-party inspection agency, or by an external laboratory, depending on the test and the project.

Standard test

Test	Basis	Performed by
Hydrostatic test	Applied to the pressure boundary of every strainer in scope. Test pressure, medium, temperature, holding time and acceptance criteria are taken from the governing design code, the approved procedure, the customer specification and the ITP – the basis differs between a valve-pattern body, a code vessel and a client-specified assembly, so no single universal test pressure is applied.	Hydrotherms, in-house

Available on request

The following are offered against project requirements. Each is quoted, planned into the ITP and performed where the order calls for it – not applied automatically.

Test	Purpose	Typically performed by
Pressure-drop test	Pressure loss across the strainer against flow	Conducted at FCRI , the Fluid Control Research Institute
Pneumatic / air leak test	Leak tightness of the boundary and joints, where a gas test is specified	Hydrotherms or a third-party agency
Seat or closure leak test	Leak tightness across a closure, where the design has one	Hydrotherms or a third-party agency
Helium leak test	High-sensitivity leak detection for critical or sealed service	Approved external laboratory
Positive material identification	Verification of alloy grade on the specified extent	Hydrotherms or a third-party agency
Hardness testing	Hardness limits, including sour-service acceptance	Hydrotherms or an approved laboratory
Ferrite measurement	Ferrite content in austenitic and duplex weld metal	Hydrotherms or an approved laboratory
Impact testing	Notch toughness at the specified test temperature	Approved external laboratory
HIC and SSC testing	Resistance to hydrogen-induced and sulphide stress cracking	Approved external laboratory
Cryogenic testing	Performance verification at low temperature	Approved external laboratory
Coating inspection	Dry film thickness, adhesion and holiday detection	Hydrotherms or a third-party agency

11 SURFACE PREPARATION, PAINTING AND PRESERVATION

The coating system is selected by the approved project specification. Where none is specified, a standard Hydrotherms system suited to the material and the stated service is offered for approval before application.

PREPARATION AND APPLICATION

- Surfaces cleaned free of rust, scale, grease and oil before preparation
- Preparation method and surface cleanliness to the specified standard
- Ambient conditions checked before application where the specification requires it
- Paint materials verified against the specified system and shelf life
- Coats applied and recorded in sequence

VERIFICATION, WHERE SPECIFIED

- Dry film thickness measurement
- Adhesion testing
- Holiday detection
- Final visual inspection of the coated surface

PRESERVATION AND PROTECTION

- Machined surfaces protected against corrosion and mechanical damage
- Flange faces protected with covers appropriate to the transport route
- Internal preservation where the storage period or the service requires it
- Desiccant and sealed protection where specified
- Openings closed to prevent ingress of dirt and moisture

PRESERVATION IS SPECIFIED, NOT ASSUMED

The right protection depends on how long the equipment will be stored, in what climate, and whether it will be stored outdoors. Those are project facts. They are agreed at contract review rather than decided on the packing bench.

12 NONCONFORMITY AND CORRECTIVE ACTION

A nonconformity is a fact to be recorded and dispositioned, not a problem to be absorbed quietly. The value of the system is that the record exists.

CONTROL OF NONCONFORMING PRODUCT

- Identified and marked as soon as it is found
- Segregated or held to prevent unintended use
- Recorded on a nonconformance report with the objective evidence
- Dispositioned by competent authority: use as is, rework, repair, regrade or reject
- Referred to the customer for concession where the contract requires it
- Re-inspected after rework or repair, to the original acceptance criteria

CORRECTIVE ACTION

- Root cause investigated, not just the symptom corrected
- Corrective action defined, actioned and owned
- Effectiveness verified after implementation
- Recurrence and trends reviewed periodically
- Findings fed back into procedures and training

CONCESSION IS THE CUSTOMER'S DECISION

Where a disposition of "use as is" or "repair" affects a contractual or code requirement, it is submitted for the customer's written approval before the item proceeds. The approval, or its refusal, is part of the record book.

13 FINAL INSPECTION AND DOCUMENTATION

Release is authorised only after the specified inspection and documentation requirements are complete and accepted. The record book is assembled from records made during manufacture, not reconstructed at the end of it.

VERIFIED AT FINAL INSPECTION

- Configuration against the approved drawing and revision
- Principal dimensions and end connections
- Nameplate and tag details, marking and durability
- Internal cleanliness and freedom from debris
- Coating condition and preservation
- Accessories, loose items and spares against the order
- Completion of every inspection and test on the ITP
- Acceptance of the documentation package

TYPICAL MANUFACTURING RECORD BOOK

Compiled to the index agreed for the project. A typical index contains only those records that apply:

- Index and release note
- Approved drawings and datasheet
- Design calculations, where contracted
- Approved QAP and ITP, signed at each stage
- Material test certificates and traceability record
- PMI report, where specified
- WPS, PQR and welder qualification records
- Heat treatment charts, where applicable
- NDE reports and personnel certificates
- Hydrostatic test report
- Additional test reports, where performed
- Coating and preservation report
- Dimensional report
- Nonconformance reports and their disposition
- Certificate of conformity

14 AUDITS, CALIBRATION AND COMPETENCE

AUDIT

Internal audits check that what is written down is what is done. Supplier audits are carried out on the risk the supplied item carries. Findings are raised, actioned and closed against a date, and their effectiveness is checked at the following audit.

CALIBRATION

Measuring and test equipment used for acceptance is uniquely identified, calibrated against traceable reference standards at a defined interval, and labelled with its status. Equipment found out of tolerance triggers review of the work accepted with it.

COMPETENCE

Welders, NDE personnel and inspectors work within the scope of their qualification. Records of qualification, continuity and training are maintained and are available for review at audit or inspection.

RECORD RETENTION

Quality records are retained for **five years** from despatch unless the contract specifies a longer period, in which case the contractual period applies. Retention beyond the standard period is agreed at contract review, so that it is planned rather than discovered later.

15 CUSTOMER AND THIRD-PARTY INSPECTION

Hydrotherms works routinely with customer inspectors, EPC representatives and third-party inspection agencies. The mechanics are agreed before manufacture so that attendance is planned rather than negotiated.

Point	What it means	Effect on the work
Hold (H)	The nominated party must attend, or waive attendance in writing	Work stops at that stage until attendance or a written waiver is received
Witness (W)	The nominated party is invited to attend	Work may proceed after the notice period if attendance is declined; the activity is recorded as normal
Review (R)	Documents are submitted for review	The record is issued for comment; comments are closed before the record book is accepted
Monitor (M)	The activity may be observed at the party's discretion	No notification obligation beyond the agreed schedule

COORDINATION

- Advance notification against the period agreed in the ITP
- Access to the relevant area, records and personnel
- Inspection results recorded and signed at the point of inspection
- Comments closed and their closure evidenced
- Final release endorsed by the authorised parties

A WAIVED WITNESS POINT IS STILL RECORDED

Where a witness point is waived, the waiver is filed with the record for that activity. The activity itself is performed, inspected and documented exactly as it would have been with the inspector present.



DISCUSS YOUR PROJECT QUALITY REQUIREMENTS

Send us the specification, the QAP and the ITP and we will respond with the inspection and documentation plan we propose, the stages we would offer for witness, and any clarification we need before manufacture.

REQUEST

A project-specific QAP or ITP

OR SUBMIT

Your technical enquiry

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