

WORK INSTRUCTION: AIR-TIGHTNESS NON-CONFORMANCE REWORK

产品气密异常受控返工与放行作业指导书 (中英双语对照标准版)

Applicable Product / 适用产品	Inflatable SUP Boards / 充气桨板及气密水上用品	Classification / 文件密级	Internal Controlled / 内部受控标准
Technical Authority / 技术归口	Engineering & QC Department / 工程部与品保部	Review Cycle / 评审周期	Annual / 每年定期评审

1. Purpose & Scope / 目的与适用范围

1.1 Purpose: To define the controlled methodology for identifying, segregating, evaluating, reworking, and re-inspecting inflatable SUP boards with air-tightness non-conformances, preventing any unintended release of non-conforming products to clients.

【目的】规范充气桨板气密异常品的识别、隔离、评估、受控返工及再检验流程，杜绝不合格品流出，确保所有出厂产品完全符合技术规格标准。

1.2 Scope: Applicable to all completed or in-process inflatable SUP boards exhibiting air leakage, pressure-retention failure, or valve/seam defects prior to pre-shipment release.

【适用范围】适用于在制过程及成品检验中发现的漏气、保压不合格、阀门及焊缝/胶接气密缺陷产品。

NON-APPLICABLE BOUNDARIES / 严禁直接返工的情形 (不适用范围)

This instruction does NOT authorize changes to approved construction, materials, graphics, or customer specifications. The following CANNOT be reworked under standard instructions:

本指导书不适用于以下情况，严禁直接上线返工：

- **Shipped / Customer-Channel Goods:** 已出货或进入客户渠道的产品。
- **Major Structural Failure:** 大面积轨道/接缝开裂、拉丝核心材料破损、板体不可逆扭曲变形或存在安全隐患的缺陷。
- **Customer Prohibitions:** 客户合同明令禁止返工的专属项目、第三方认证样件及已封样黄金样板。
- **Recurring / Non-Locatable Leaks:** 无法准确定位或经一次返工后复检依然失效的反复漏气品（必须走报废/替换/工程评审流程）。

2. Defect Classification & Authorization Matrix / 缺陷分类与审批矩阵

Class / 类别	Typical Defect / 典型位置与表现	Disposition Route / 判定处置路径	Approval Level / 审批权限
Class A Valve Interface	阀芯、阀盖、密封圈杂质/偏位、充气接口漏气 Valve core/gasket misalignment	通常允许标准返工（清洁、紧固、更换受损密封件） Standard rework authorized	QC Inspector / 质检员
Class B Valve Base Seam	阀门底座周边微量慢漏 Micro-leakage at valve perimeter	需工程评估，按专用工艺卡受控补胶或重压密实 Requires approved method card	QC + Engineering / 品保+工程
Class C Pin-Hole / Surface	非承力表面局部微孔、点状微漏 Local cosmetic/surface micro pinhole	仅限客户允许的材料和受控补胶工艺 Allowed only per project spec	QC + Engineering / 品保+工程
Class D Local Rail / Seam	局部侧包边、接缝搭接处漏气 Local seam or rail overlap leak	高风险：必须工程评审，严禁操作工自行涂胶 High risk; engineering review mandatory	Eng + QA Head / 工程+品保负责人
Class E Massive / Rail Leak	大面积接缝开裂、鼻/尾高应力区连续漏气 Large rail failure / high-stress leak	通常不可常规返工；执行报废或工程专题分析 Standard rework prohibited; Scrap/Replace	QA Head + Customer Concession
Class F Recurring Leak	漏点不可定位、或返工后复测再次失效 Non-locatable or re-test failed leak	禁止二次返工；直接开具报废或材料根因调查 No repeat rework; root cause analysis	Engineering Lead / 首席工程师
Class G Structural Rupture	拉丝内部脱层、板体鼓包扭曲、底座撕裂 Drop-stitch rupture / delamination	绝对报废品；严禁出厂或私自维修放行 Absolute scrap / Zero tolerance	Reject / Scrap / 报废审批

3. Standard Operating Workflow (Step 1 - Step 7) / 标准返工作业流程

Step 1: Detection, Stop-Line & Quarantine / 发现、停线与受控隔离

Immediately halt line progression for defective boards. Record Board ID, SKU, Batch, and Station. Affix a red **HOLD / QUARANTINE** label and move to the designated rework quarantine buffer. Generate a formal Non-Conformance Report (NCR).

【作业要点】立即停流异常板，记录唯一板号、批次与工位；张贴红底 **HOLD (待处理)** 隔离标识，移送指定隔离区并建立 NCR 不合格品追踪单。

Step 2: Leak Point Diagnosis & Non-Damaging Marking / 漏点精准定位与无损标记

Inflate board to approved diagnostic pressure. Systematically inspect valve seal, rail seams, nose, and tail using calibrated bubble solution or acoustic detection. Mark exact leak coordinates with removable chalk/marker. Document with photographic proof. Deflate safely prior to intervention.

【作业要点】充气至诊断测试气压，按规范检查阀门、侧边轨道、鼻部及尾部；使用中性检漏液或专业仪器定位，使用无残留标记笔标定，拍照存证，作业前务必先安全排气。

Step 3: Engineering Disposition & Rework Authorization / 缺陷评估与返工授权审批

QC & Engineering evaluate defect classification against project tolerances. Rework is authorized ONLY if compliant with an approved Method Card. If restoration to original specification is impossible (Repair only), mandatory customer written concession is required.

【作业要点】QC与工程核定缺陷等级及工艺卡编码。明确“返工（Rework恢复原规格）”与“修理（Repair需客户让步）”边界，未经签字授权严禁开工。

Step 4: Controlled Rework Execution / 受控返工操作与工艺卡执行

Execute strictly according to specific process cards (cleaning, approved glue batch, correct mixing ratio, heat/pressure parameters). Rework strictly within defect perimeter without altering original graphics, EVA, or dimensions. Record operator ID, material lot, and timestamps.

【作业要点】严格按照分项工艺卡执行（基底清洁、专用胶水批号、恒温固化与保压工具）。严禁私自扩充返工区域或擅改图样。详细记录操作员与材料批次。

Step 5: Cure Stabilization & Visual Pre-Check / 恒温固化与外观初检

Hold board in controlled ambient area for specified curing duration per material TDS. Check for glue residue, bubbling, uneven surface, or discoloration. Product MUST remain in HOLD status until full curing cycle finishes.

【作业要点】按材料 TDS 及工厂标准完成全周期静置固化。固化未达标前严禁提前打气；初检修补平整度、溢胶及色差，确认无二次外观损伤。

Step 6: Re-Inspection & High-Pressure Proof Testing / 严苛复检与保压再验证

Re-inflate to project-approved test pressure. Conduct 100% full-cycle pressure drop testing (e.g. 24h/48h duration) and re-check the original leak coordinate and surrounding seams. Acceptance standard is identical to primary production—**Rework does NOT lower quality standards.**

【作业要点】打气至规定保压检验压力，进行完整周期保压与气泡复查。**返工决不降低放行标准！** 复检若失败，直接升级判定，严禁擅自反复补胶。

Step 7: QA Release or Final Scrap / 质量放行签署与闭环归档

QC & Quality Manager audit completed NCR, material lot traceability, and pressure decay records. Sign official QA Release stamp and update board status from HOLD to RELEASED. Archive all records.

【作业要点】品保主管复核 NCR 单、返工记录及保压数据，签署放行章后方可转入包装工序，全套数据归档备查。

4. Standard Controlled Record Templates / 质量记录与追溯表单

Form A: Air-Tightness NCR & Rework Form (气密不合格及返工单)	Form B: Re-Inspection & QA Release Log (复检与放行记录单)
NCR No: NCR-202608-_____ Product Model / SKU: _____ Board Serial ID: _____ Production Batch: _____ Defect Class: ☐ A ☐ B ☐ C ☐ D ☐ E/F/G Leak Location: ☐ Valve ☐ Rail ☐ Seam ☐ Nose/Tail Approved Method Card: MC-RW-_____ Material Batch / Exp: _____ Operator & Station: _____ Engineering Sign-off: _____	Link NCR Ref: NCR-202608-_____ Re-Test Pressure: _____ PSI / BAR Hold Duration: _____ Hours (Start/End) Pressure Decay: $\Delta P =$ _____ PSI (Pass/Fail) Original Leak Re-Check: ☐ PASS ☐ FAIL Seams & Rails Re-Check: ☐ PASS ☐ FAIL Workmanship / Appearance: ☐ PASS ☐ FAIL Final Disposition: ☐ RELEASED ☐ SCRAP QA Inspector: _____ Date: _____

5. Engineering Safeguards & Prohibitions / 工程防错与红线原则

- **No Speculative Rework:** 严禁在未准确定位泄漏点、未开具 NCR 时擅自抹胶或烘烤。
- **Material Integrity:** 严禁使用未注明批号、过期或非工程承认的胶水、固化剂与清洗溶剂。
- **No Parameter Leaks on Public Web:** 官网技术展示仅公示管理架构、受控流程与严苛放行准则；严禁泄露核心配方配比、私有胶水牌号及专有工艺温度时间等商业机密。