



QUALITY MANUALS | FIRST EDITION

IAF INCIDENT RESPONSE AND EV BATTERY SAFETY MANUAL

Factory emergency response
and controlled battery quarantine

STABLE RELEASE

Document No. IAF-MAN-IRB-001 | Revision 01

Solvent fires and thermal runaway response
Engineered quarantine and remote transfer systems
Electrical rescue coordination and adult first aid

International Automotive Federation

English master text | 15 September 2026

iaf.com

Publication identity and use

IAF Industrial Incident Response and EV Battery Safety Manual

This manual defines factory preparedness and response for solvent fires, lithium ion battery events and electrical injury. It separates evacuation and first aid from specialist firefighting, electrical rescue and engineered quarantine, with clear incident command and release records.

Control	Publication record
Document	IAF-MAN-IRB-001 IAF Industrial Incident Response and EV Battery Safety Manual
Edition / revision	First Edition Revision 01 Stable Release
Text issue	15 September 2026 English master text
Document owner	IAF Quality function with the relevant automotive technical committee
Custodian	IAF Secretariat / Document Controller
Institutional authority	Competent authority under IAF-CON-001; publication does not amend the Constitution.
Site adoption	Accountable operating director and technical leads record the actual approval reference, scope and operational effective date.
Classification	Public core manual. Completed operational records follow their assigned access and retention controls.

Reading and applying requirements

“Shall” identifies a requirement when adopted by a site, programme or agreement. “Should” identifies a recommendation. An example is illustrative; it is not a machine setting, test acceptance limit or completed operating record. Annex worksheets may be reproduced for controlled internal use.

Controlled implementation

Stable Release identifies the completed publication text. Site approval, process validation, competence authorization and equipment release are recorded when performed. A missing safety limit, test criterion or release authority prevents activation of the affected operation. Mandatory law, product requirements and validated equipment instructions remain applicable.

Relationship to IAF recognition

Use of this manual does not by itself confer membership, Corporate Recognised status, accreditation, certification or a licence to use IAF marks. Those decisions follow the applicable IAF guides, independent evaluation and recorded scope.

Contents

Every entry links to its section. Page numbers include the cover.

1 Purpose scope and response priorities	5
2 Command authority and role boundaries	6
3 Hazard inventory and battery identification	7
4 Facility protection and emergency infrastructure	8
5 Pre incident plans and scenario evaluation	9
6 Detection alarm and escalation	10
7 Worker alarm and evacuation	11
8 Incident command and responder handover	12
9 Exclusion zones atmosphere and access	13
10 Solvent fire prevention and readiness	14
11 Solvent fire response coordination	15
12 Battery instability and thermal runaway	16
13 Battery event initial response	17
14 Fire control cooling and exposure protection	18
15 Gas accumulation enclosures and pressure hazards	19
16 Electrical safe access and rescue coordination	20
17 Adult electrical injury first aid	21
18 Burns inhalation and medical follow up	22

Contents - continued

Every entry links to its section. Page numbers include the cover.

19 Quarantine facility design and acceptance	23
20 Engineered remote transfer to quarantine	24
21 Conditional immersion and quarantine pools	25
22 Automation failure and protective system impairment	26
23 Quarantine monitoring and specialist release	27
24 Firewater runoff and damaged battery waste	28
25 Decontamination cleanup and area release	29
26 Investigation recovery and production restart	30
27 Training exercises and competence assurance	31
28 Controlled information and IAF interfaces	32
Annex A Emergency contacts and site readiness record	33
Annex B Scenario response planning matrix	34
Annex C Incident command and decision log	35
Annex D Quarantine transfer authorization	36
Annex E Conditional immersion system acceptance	37
Annex F Battery quarantine monitoring and disposition	38
Annex G Adult electrical injury first aid card	39
Annex H Recovery readiness and exercise review	40

Using the annexes

Enter actual values, evidence references, names and dates in the worksheets. A blank, unsigned or illustrative record is not proof of completion. Retain the record with its governing instruction and revision.

1 Purpose scope and response priorities

1.1 This manual defines preparedness, response coordination and recovery for automotive factory solvent fires, lithium ion battery events and electrical injury. It covers production lines, battery assembly and testing, charging, storage, internal transport and engineered quarantine facilities. Its primary purpose is to protect people through early warning, evacuation, controlled specialist intervention and documented release.

1.2 The requirements distinguish ordinary workers, trained first aiders, authorized electrical specialists, industrial emergency teams and public emergency responders. A person shall act only within demonstrated competence, equipment capability and the incident plan. Reading this manual does not authorize entry into smoke, firefighting, live electrical rescue or handling a thermally unstable battery.

1.3 A suspected serious fire or battery event requires immediate alarm and evacuation of the affected area; do not delay to confirm the exact chemistry or take measurements close to the source. Local emergency numbers, alarm methods and assembly points shall be posted and practiced. The site shall define escalation beyond the initially affected area according to its hazard analysis.

1.4 Automatic quarantine transfer and immersion systems are specialized engineering arrangements. They shall be used only for validated battery and incident scenarios with defined authorization and protective functions. This manual does not require every battery or vehicle to be immersed, and it does not treat water contact as proof of electrical safety.

1.5 Life safety takes priority over production, equipment recovery and evidence preservation. A remote shutdown may be used only where it is safe and its effect is understood. No worker shall carry, drag or drive a smoking, venting or burning battery through an occupied area in an attempt to protect the production line.

2 Command authority and role boundaries

2.1 The site director shall appoint an emergency programme owner and maintain an on-duty incident command arrangement for every operating shift. The first designated commander establishes immediate protective actions and transfers command formally when the competent responding authority takes control. Record the transfer, current hazards, actions and outstanding needs.

2.2 Ordinary workers shall raise the alarm, move away, use the safe evacuation route and report to the assembly point. They may operate an accessible emergency control only if trained and if doing so does not delay escape or expose them to heat, smoke, electrical contact or moving equipment. They shall not investigate inside the hazard area.

2.3 First aiders provide care only after safe access is established. Electrical specialists determine the electrical isolation and access boundary using the relevant equipment procedure. Industrial emergency teams operate within their training, staffing and equipment limits; if those limits are exceeded, they shall withdraw and support the responding emergency service.

2.4 The incident commander coordinates zones, evacuation, specialist advice, firewater and environmental control, casualty care and external communication. Technical specialists advise on battery design, chemicals, machinery and utilities. Advice does not authorize an individual to disregard the command structure or enter a restricted zone independently.

2.5 Security controls access and responder routing; supervisors account for personnel; environment personnel manage runoff and waste after safe access; communications personnel issue approved factual updates. Annex A records contacts and deputies. Authority to restart production is separate from authority to end active firefighting and requires the recovery checks in this manual.

3 Hazard inventory and battery identification

3.1 Maintain an accessible inventory of solvents, coatings, gases, batteries, energy systems and significant storage quantities. Identify their locations, hazards, isolation points and emergency information. Update it when products, layouts or quantities change and make essential information available to responders during a network or power failure.

3.2 For batteries, record manufacturer, model, chemistry where known, cell format, module or pack arrangement, nominal voltage, maximum relevant voltage, energy, state of charge information and physical configuration. Identify whether the item is a loose cell, open assembly, sealed pack, vehicle or stationary system. Instructions for one configuration shall not be assumed valid for another.

3.3 Include damaged, returned, rejected, prototype and partially assembled batteries in the inventory. Unknown state of charge, hidden damage or missing protection can increase uncertainty. Separate normal production stock from suspect material and define handling restrictions before an incident occurs.

3.4 Map solvent type, storage and transfer systems, paint mixing areas, ovens and potential ignition sources. Keep current safety information and compatibility guidance accessible. Identify water reactive materials and other hazards that could interact with a fire response; lithium ion batteries shall not be confused with bulk lithium metal or unrelated combustible metal processes.

3.5 Identify stored electrical energy beyond the main supply, including batteries, capacitors, test equipment and regenerative drives. A supply disconnect or open battery contactor may isolate external circuits while leaving substantial internal energy. The emergency plan shall state which hazards remain after each shutdown action.

4 Facility protection and emergency infrastructure

4.1 Engineering shall define fire compartments, separation, ventilation, detection, suppression, escape routes and emergency access from the actual hazard and inventory. Storage density, battery energy, solvent quantity and adjacent exposures affect the design. This manual provides no universal stand-off distance, water volume or quarantine capacity.

4.2 Provide alarm coverage suitable for noisy, occupied and lightly staffed areas, including visual or other accessible warnings where needed. Emergency lighting, clear exits and assembly arrangements shall remain functional during the relevant failure scenarios. Control changes that obstruct routes or increase travel difficulty, including temporary stock and mobile equipment.

4.3 Emergency controls shall be identified, accessible from safe locations and integrated through a documented cause and effect matrix. Shutdown of a process, conveyor, charging circuit or ventilation system shall have a known safe consequence. Indiscriminate shutdown of all ventilation or utilities can worsen some events and shall not replace the engineered response.

4.4 Maintain firewater, detection, gas monitoring, drainage containment and communications according to their required capability. Impairment of a critical protection system shall trigger an assessment of operating restrictions, temporary measures and restoration priority. A disabled detector shall not be accepted as a routine solution to repeated alarms.

4.5 Coordinate access, water supply and site hazards with the responding emergency service through pre-incident planning. The site shall understand what specialist capability is actually available and its likely access constraints. Do not assume that a distant external team can provide an immediate capability needed to make an otherwise unsafe operation acceptable.

5 Pre incident plans and scenario evaluation

5.1 Prepare scenario plans for solvent spills and fires, battery damage without heating, abnormal heating or venting, thermal runaway, multiple item propagation, electrical injury and loss of a quarantine system. Include credible combined events such as a battery fire affecting solvents, an obstructed exit or power loss during automatic transfer.

5.2 Each plan shall identify detection, immediate worker actions, command escalation, isolation, zones, responder needs, firewater and runoff arrangements, monitoring and recovery. Define decision criteria and the person authorized to apply them. A generic emergency folder without location specific actions is insufficient for a complex production area.

5.3 Use engineering analysis and suitable test evidence to establish battery response and quarantine design assumptions. Document the product range, energy and state of charge envelope, event stage, expected gas and heat hazards and limits of the evidence. A demonstration on a small cell shall not be treated as validation for a large pack or occupied vehicle.

5.4 Agree the information responders need on arrival: people missing, location, inventory, battery type, electrical state, actions taken, current alarms and accessible isolation points. Keep plans concise enough for emergency use and supporting technical detail available separately. Annex B provides a scenario planning structure.

5.5 Review plans after layout changes, new chemistries, higher inventory, incidents and drills. Test the practical route, communication and command assumptions without creating live hazardous conditions. Where a required capability is unavailable, reduce or suspend the affected operation until an adequate arrangement is established.

6 Detection alarm and escalation

6.1 Battery warning signs can include unusual heat, swelling, leakage, hissing, popping, odour, vapour or smoke, but a dangerous event may develop without every sign. Workers shall not approach to smell, touch or closely inspect a suspect battery. A credible abnormal condition shall trigger the local alarm and protective response appropriate to the assessed scenario.

6.2 Detection systems shall be selected for the actual battery, storage arrangement and environment. Temperature, smoke, gas and electrical data provide different information and limitations. A thermal camera may show surface temperature without revealing internal conditions, and a battery management system may be unavailable or unreliable after damage.

6.3 Define alert and emergency action thresholds from the validated process and hazard assessment. Record units, sensor location, trend or rate criteria, voting logic where used and response to sensor failure. This manual does not supply a universal temperature or gas concentration that proves safety for every battery.

6.4 Alarm messages shall identify the location and required immediate action. Route critical alarms to people available on the affected shift and confirm receipt through the defined system. A nuisance alarm history requires investigation; repeated resetting without correction can conceal a genuine event.

6.5 Escalate promptly where smoke, venting, rapid heating, fire, explosion indicators or uncertain electrical exposure exist. Personnel shall not wait for a second independent indication where the plan calls for evacuation on the first credible sign. Preserve time stamped alarm data remotely where possible without delaying protective action.

7 Worker alarm and evacuation

This procedure applies to workers and visitors who discover a solvent fire, suspected battery thermal event or other serious emergency. It does not authorize firefighting or entry into a hazardous area.

Step / owner	Required action and evidence
1 Recognize and alarm	Move away from the immediate hazard and activate the nearest safe alarm method. State location and observed condition without approaching to gather additional detail.
2 Call for response	Use the posted site emergency contact and local emergency number as instructed. Give the exact access point, people at risk and known battery or chemical involvement.
3 Leave safely	Follow the available safe exit route and warn others while leaving. Do not collect belongings, move the suspect battery or enter smoke. Use an alternate route if the normal route is affected.
4 Assist within limits	Help others evacuate only where this can be done without entering the hazard. Follow the planned assistance arrangements; do not attempt an untrained rescue.
5 Account for people	Report to the designated assembly point. Supervisors reconcile employees, contractors and visitors and report missing persons with their last known location to command.
6 Remain available	Stay clear of response routes, follow instructions and report relevant observations. Do not re-enter until the authorized all clear and any additional area restrictions are communicated.

Do not delay evacuation to operate a remote shutdown unless the action is trained, immediately accessible and safe. Nobody shall re-enter to search for a missing person without the required rescue capability and command authorization.

8 Incident command and responder handover

8.1 The incident commander shall establish a safe command location and obtain an initial situation report from alarms, witnesses and remote information. Identify life safety priorities, likely escalation and available resources. Decisions shall reflect uncertainty; absence of visible flame does not establish that a damaged battery or solvent atmosphere is safe.

8.2 Request appropriate emergency services early and provide site access, escort and hazard information. Confirm command relationships on arrival and record the transfer of responsibility. The factory technical team shall remain available to explain equipment, isolation, inventories and engineered systems without independently directing frontline tactics.

8.3 Maintain a time stamped incident log of alarms, evacuation, accountability, shutdowns, zone changes, specialist advice and major decisions. Annex C provides the structure. Record the reason for a decision and the information available at the time, especially where conditions changed or a planned action was abandoned.

8.4 Assign responsibility for responder accountability, communications, safety monitoring and environmental coordination. Avoid sending multiple teams into a zone without shared awareness. A loss of communications, personnel accountability or a critical protective capability shall trigger reassessment and, where necessary, withdrawal.

8.5 Provide regular factual updates to affected people through the designated communication route. Protect casualty privacy and avoid speculation about cause. Production restart, public statements and waste disposition shall remain controlled decisions after the immediate emergency, not informal consequences of a quiet scene.

9 Exclusion zones atmosphere and access

9.1 Establish hot, controlled support and safe zones from the actual heat, smoke, gas, explosion, electrical and structural hazards. Boundaries may change with wind, ventilation, building configuration and incident growth. The commander shall set and communicate them using competent technical advice; a fixed distance from this manual shall not be substituted for that assessment.

9.2 Restrict hot zone access to personnel with the necessary training, protective equipment, respiratory protection, communications and command authorization. Battery and solvent fire atmospheres can contain toxic and flammable products and may lack oxygen. Ordinary masks or unverified filter respirators are not suitable protection for an unknown fire atmosphere.

9.3 Atmospheric testing shall use instruments appropriate to the hazards, with trained interpretation and verified condition. Record locations, time, sampling method and limitations. A single gas reading or low surface temperature cannot establish the absence of all hazards, and measurement shall not require an unprotected person to approach the source.

9.4 Assess building stability, pressure effects, falling material, stored gas devices, adjacent batteries and energized equipment before entry. Maintain escape and withdrawal arrangements for responders. Confined or enclosed locations require their specific rescue and entry controls in addition to the incident plan.

9.5 Keep unauthorized personnel, vehicles and ignition sources outside controlled zones. Coordinate wind and drainage information with the environmental lead. Zone reduction requires an explicit command decision based on current evidence, and the end of visible smoke is not by itself an all clear.

10 Solvent fire prevention and readiness

10.1 Control solvent inventory, storage, transfer and use through compatible containers, ventilation, spill prevention and ignition source management. Identify flash and vapour hazards from the actual substances and process conditions. Bonding, grounding and equipment suitability shall be engineered for the operation rather than added informally after a near miss.

10.2 Keep paint mixing, cleaning and waste solvent areas orderly and segregated from hot work and battery quarantine. Manage contaminated wipes, residues and empty containers according to their hazards. An apparently empty container can retain a hazardous vapour atmosphere and shall not be cut, heated or repurposed without the required controlled process.

10.3 The fire plan shall identify suitable extinguishing media for the actual liquids and the capability of installed systems. Compatibility differs among solvents and other materials. An indiscriminate water jet can spread burning liquid; a generic instruction to use any available extinguisher is unacceptable.

10.4 Define the approved response of fuel or solvent pumps, transfer valves, ovens and ventilation through the cause and effect matrix. Remote isolation shall be used only if it can be performed safely and does not create an uncontrolled release or worsen vapour accumulation. Workers shall not enter a spill or smoke zone to reach a valve.

10.5 Initial extinguisher use shall be limited to trained, authorized personnel facing a small incipient fire, with the correct equipment, a clear escape path and no hazardous smoke exposure. If these conditions are absent or the fire does not promptly respond, withdraw and close off the area as the plan allows. Battery thermal events require their dedicated response.

11 Solvent fire response coordination

The commander and trained response team shall use the location specific solvent plan. Ordinary workers follow the evacuation procedure and shall not attempt the specialist actions below.

Step / owner	Required action and evidence
1 Alarm and protect	Activate the emergency response, evacuate the affected area and account for people. Identify the solvent and adjacent hazards from safe records or remote information.
2 Establish command	Set zones, request the required fire service capability and confirm a safe approach. Assess vapour spread, drainage, structural exposure and potential escalation.
3 Control sources	Have authorized personnel operate safe remote isolation and the engineered ventilation or process response. Do not send workers into the hazard to close valves or stop equipment.
4 Select tactics	Competent fire responders select compatible media, application and protective arrangements from the actual chemical and scene conditions. Protect escape and adjacent exposures.
5 Manage runoff	Implement the preplanned containment where safe, without delaying life saving actions. Prevent uncontrolled spread through drains and notify the environmental lead.
6 Verify recovery	Maintain monitoring for re-ignition and hazardous vapours. Control cleanup, electrical checks and restart through the authorized recovery process after command releases the scene.

A blanket instruction to apply water, foam or powder to every solvent fire is not permitted. Never enter an untested atmosphere to inspect the result. Record the actual medium, actions and residual hazards for the recovery team.

12 Battery instability and thermal runaway

12.1 Thermal runaway is an uncontrolled self-heating process within a cell that can release heat, flammable and toxic gases and projectiles, with possible propagation to other cells. External flames may reduce while internal reactions continue. A battery can retain hazardous electrical energy after shutdown or apparent fire suppression.

12.2 Classify the observed condition for response purposes without delaying alarm: damaged or suspect with no thermal signs; abnormal heating or venting; active fire or rapid escalation; and post-event residual hazard. The site plan shall define protective actions for each condition and account for uncertainty when state of charge or internal condition is unknown.

12.3 Stop charging, testing or handling through the approved safe remote controls where possible. Do not disconnect cables, open enclosures or touch a suspect pack to determine whether it is hot. A normal display, reported low state of charge or absence of flame shall not override credible evidence of damage or abnormal behaviour.

12.4 Loose cells, open modules, sealed packs and complete vehicles present different access, containment and electrical hazards. The response plan shall identify the actual configuration and product specific restrictions. Guidance for a vehicle shall not automatically be applied to a rack of exposed cells or a damaged production module.

12.5 Keep adjacent stock and personnel protected through the preplanned separation and response arrangements. Do not improvise a transfer, sealing or discharge method during escalation. A damaged battery shall not be returned to production or normal storage until competent assessment and the defined release evidence support that decision.

13 Battery event initial response

Use this sequence for suspected abnormal heating, venting, smoke or fire involving a lithium ion battery. The first actions prioritize evacuation and command, not movement of the battery.

Step / owner	Required action and evidence
1 Discoverer	Raise the alarm from a safe position and leave the affected area. Report location, observed signs and known battery configuration; do not approach to confirm temperature or odour.
2 Supervisor	Activate the site emergency plan, account for people and prevent entry. Request the required emergency responders and provide access and current inventory information.
3 Authorized operator	Use only the preplanned safe remote shutdown where available. Do not touch damaged connections or assume the battery is electrically safe after external power is removed.
4 Incident commander	Establish zones and specialist coordination. Assess exposures, gas accumulation, water supply, drainage and the risk of propagation using remote information where possible.
5 Technical and fire leads	Choose contain in place, defensive protection or another validated response. Consider transfer only if the engineered system and incident conditions meet every authorization criterion.
6 Command and monitoring	Maintain control through suppression, stabilization and quarantine. Record trends, decisions and residual hazards and arrange specialist handover before reducing restrictions.

Personnel shall not manually move a smoking, venting or burning pack through occupied space. If an automatic system is unavailable or outside its validated envelope, retain the protective response and assess containment in place; do not force a transfer by bypassing interlocks.

14 Fire control cooling and exposure protection

14.1 Firefighting tactics shall be selected by competent incident command and trained responders for the actual battery, configuration and scene. The site plan shall address sustained cooling capability, access, adjacent exposures and the possibility that flame control does not stop internal propagation. Ordinary workers shall not be assigned hose or close approach duties by this manual.

14.2 Plan the water or other resource supply from the engineered scenario and responding service requirements. Cooling is often a central consideration for lithium ion events, but effectiveness depends on access to the heat and system design. Do not claim that any agent or quantity universally terminates thermal runaway or makes a pack safe.

14.3 Protect adjacent batteries, structures and solvent inventories using the approved response. A visible flame reduction shall be assessed together with thermal trends, gas indications, electrical hazards and the condition of surrounding materials. Responders shall retain appropriate protection during the residual hazard phase.

14.4 Do not puncture, cut or open a pack to introduce an extinguishing agent unless a specifically engineered, validated and authorized method applies to that exact system and response team. Improvised penetration can cause electrical contact, short circuit, gas release or additional cell damage.

14.5 Record cooling interruptions, resource limitations and changes in condition for the monitoring and recovery team. If safe effective intervention cannot be sustained, command shall reassess tactics and protection of people and exposures. Production urgency shall not determine the point at which responders withdraw or release the area.

15 Gas accumulation enclosures and pressure hazards

15.1 Battery vent gases can create toxic exposure and flammable atmospheres before or after visible flame. Enclosed rooms, containers, ducts and equipment housings can concentrate gases. The hazard assessment shall consider ignition and pressure effects as well as smoke removal and heat.

15.2 Ventilation response shall follow an engineered cause and effect plan for the location and scenario. Opening doors, restarting fans or disturbing an enclosure can change oxygen supply and move flammable gas to an ignition source. Such actions require competent command evaluation rather than an automatic assumption that more ventilation is always safer.

15.3 A cover, blanket or container shall not be assumed to stop thermal runaway or make the surroundings safe. Enclosure can retain flammable gases and heat. Any use of these systems requires a validated purpose, pressure and gas management, electrical considerations and a monitored operating method.

15.4 Do not seal a damaged or actively venting battery in an improvised airtight box. Quarantine containers and buildings shall have an engineered approach to gas and pressure hazards suited to the battery envelope. A shipping package approved for an intact item is not necessarily suitable for a post-fire pack.

15.5 Gas monitoring shall cover the relevant hazards and locations with suitable equipment and trained interpretation. Record instrument limits, cross-sensitivity and sampling constraints. Unknown atmosphere remains restricted; a reading for one gas does not prove absence of other toxic substances or an oxygen hazard.

16 Electrical safe access and rescue coordination

16.1 Treat a casualty, damaged equipment, battery enclosure and nearby conductive surfaces as potentially energized until a competent electrical authority establishes the safe access boundary. Do not touch the person, cables, metalwork or standing water while the electrical hazard is uncontrolled. A responder becoming a second casualty does not help the injured person.

16.2 Raise the alarm and request emergency medical and electrical response immediately. Use an accessible safe remote emergency isolation only if trained and authorized. Consider multiple supplies, stored energy, test equipment and automatic restart. A dark display or released contactor is not sufficient proof of de-energization.

16.3 Electrical specialists shall apply the equipment specific isolation, stored energy and verification method using suitable rated equipment and protective arrangements. Define the remaining live parts and the safe rescue route. Damaged batteries may retain internal energy even when external circuits are isolated.

16.4 Do not use a broom, wooden pole, clothing or other improvised object to separate a person from a high voltage source. Rescue with specialist equipment requires trained personnel, an approved method and command coordination. Account for arc, contact and step potential hazards and prevent untrained people from entering the boundary.

16.5 Once safe access is confirmed, first aiders shall assess and care for the casualty promptly under the next section. Communicate the mechanism, voltage information if known, contact duration, fall or arc exposure and isolation status to medical responders. All suspected high voltage exposures require urgent medical assessment, including when the person initially feels well.

17 Adult electrical injury first aid

Apply only after competent personnel have established safe access. Call the posted local emergency number immediately. These adult first aid actions support trained responders and dispatcher instructions; they do not authorize live electrical rescue.

Step / owner	Required action and evidence
1 Safe access	Do not touch the casualty until the electrical danger is controlled. Once access is safe, check response and normal breathing promptly; gasping is not normal breathing.
2 Summon help	Send someone for the AED and first aid kit and to guide medical responders. If alone, use a phone on speaker where possible and follow emergency dispatcher instructions.
3 Start adult CPR	For an unresponsive adult not breathing normally, begin compressions in the centre of the chest on a firm surface. Aim for 100 to 120 per minute, about 5 to 6 cm deep, with full recoil.
4 Provide breaths	If trained and able, use cycles of 30 compressions and 2 breaths with minimal interruption. If unable to give breaths, provide continuous compressions and follow dispatcher guidance.
5 Use the AED	Follow its prompts, expose and dry the chest and keep everyone clear during analysis and shock. Use only in a safe environment, away from flammable atmosphere and standing water.
6 Continue and hand over	Resume CPR as prompted and continue until professional takeover, clear signs of life, exhaustion or renewed danger. If breathing normally, monitor closely and follow trained care and dispatcher advice.

Do not delay CPR or AED use to treat burns. Avoid unnecessary movement where a fall or trauma is suspected, while prioritizing airway and resuscitation. Report all electrical exposures for urgent medical assessment and do not permit the casualty to return to work on the basis of apparent recovery alone.

18 Burns inhalation and medical follow up

18.1 After life threatening conditions are addressed and the scene is safe, trained first aiders shall manage burns within their competence and dispatcher guidance. Cool an appropriate thermal burn with cool running water where safe, avoid ice or creams and prevent whole body chilling. Do not remove material stuck to a burn or delay urgent transport for prolonged treatment.

18.2 Electrical injury can involve internal damage that is not reflected by a small skin mark. Arrange urgent medical assessment for suspected high voltage contact or significant arc exposure, and communicate any loss of consciousness, chest symptoms, breathing difficulty, burns or fall. A reassuring initial appearance is not a release to resume work.

18.3 For smoke, vapour or chemical exposure, move the person to a safe atmosphere only when rescue can be performed without exposing others. Do not enter a hazardous atmosphere without the required rescue capability. Follow the substance specific first aid information and medical advice; do not administer improvised neutralizers, antidotes or medication.

18.4 Provide medical responders with the known battery or chemical identity, safety information, exposure route and duration and care already given. Record the person's details confidentially. Decontamination needs shall be coordinated with the response team so contaminated clothing or equipment does not expose transport staff and treatment areas.

18.5 Occupational health shall coordinate follow-up and fitness for return to work where appropriate. Supervisors receive necessary work restrictions rather than unrestricted medical records. Review the event for prevention while protecting privacy and avoiding blame for prompt reporting or seeking care.

19 Quarantine facility design and acceptance

19.1 A quarantine facility shall be designed for the declared battery types, quantities, energy, state of charge range and credible damage states. Define receiving conditions, separation, structural capacity, drainage, fire protection, gas management, electrical hazards, monitoring and secure access. Normal stock storage and incident quarantine shall have clearly different status and controls.

19.2 Evaluate dry segregated containment as a design option alongside other validated arrangements. A dry area still requires protection against heat, propagation, gases and re-ignition. The design shall identify whether it can receive a suspect but stable item, a post-event item or an actively unstable item; these are not interchangeable acceptance categories.

19.3 Provide safe remote observation and a controlled transfer route where movement is part of the plan. The route shall protect occupants and escape paths and account for load support, dropped item hazards, loss of power and an unavailable destination. A quarantine area that can be reached only through occupied assembly space may be unsuitable for an active event.

19.4 The acceptance dossier shall include engineering analysis, product compatibility, test evidence, commissioning, maintenance and emergency arrangements. Where actual hazard testing is necessary, it shall be performed by competent specialists in an appropriate controlled facility, not by intentionally provoking thermal runaway on the operating factory floor.

19.5 Annex D records transfer authorization and Annex E records any immersion system acceptance. No facility shall be described as universally safe for every chemistry, pack or incident stage. Changes in battery size, energy, construction or storage density require review before the existing approval is extended.

20 Engineered remote transfer to quarantine

Transfer is permitted only within a validated system and incident scenario. It is not the default response to every battery alarm. The commander may choose containment in place where movement would increase risk.

Step / owner	Required action and evidence
1 Confirm eligibility	Identify the battery and observed event state using safe information. Confirm that the system approval covers the exact configuration, mass, geometry and hazard condition.
2 Compare options	Command and technical specialists assess containment in place against transfer risks. Confirm that movement will not expose people, obstruct escape or spread the incident through the factory.
3 Verify readiness	Check destination capacity, route segregation, supports, sensors, fire and gas controls, drainage and power or backup condition. A failed critical check blocks initiation.
4 Authorize sequence	Record the command authorization and operator. Use only the approved automatic or remote sequence; any automatic trigger logic must have prior explicit approval in the incident plan.
5 Monitor movement	Observe remotely, maintain exclusion and track system status. On obstruction, unstable load, lost sensing or another fault, apply the validated safe response; do not bypass interlocks or send workers in.
6 Confirm handover	Verify arrival, stable support and destination monitoring without close unprotected approach. Record the battery identity, condition, time and receiving authority and maintain quarantine restrictions.

An emergency stop or power failure response shall be engineered for each stage; it may require containing the item where it is. Manual recovery of a stalled system requires a separate specialist plan after the hazard is assessed. Ordinary forklifts or improvised lifting are not substitutes for the validated active-event transfer system.

21 Conditional immersion and quarantine pools

21.1 An automatic quarantine pool or immersion tank is permitted only where the exact battery configuration and intended incident scenario have a documented technical basis, product specific compatibility and competent engineering acceptance. Some products prohibit immersion as a fire response. A product restriction shall not be overridden by a generic site preference for a pool.

21.2 The assessment shall compare immersion with dry containment and other response options. Address whether cooling reaches the relevant heat source, electrical leakage, gas production, buoyancy, structural loading, compatibility, contamination, overflow and safe retrieval. Do not assume immersion stops every internal reaction or eliminates hazardous stored energy.

21.3 The design shall specify the actual medium, capacity, operating levels, temperature management, containment, gas and pressure controls, monitoring and failure behaviour. Values shall come from the validated system design. Do not add salt or other chemicals to discharge a pack through an improvised recipe; this can introduce additional reactions, gas and handling hazards.

21.4 Movement into a pool follows the transfer authorization procedure and shall not require people to approach a venting or burning item. Keep personnel out of the water and electrical hazard boundary. Entry, retrieval, drainage and maintenance require specialist assessment and isolation arrangements appropriate to the residual hazard.

21.5 Annex E shall be complete before commissioning. If compatibility, gas control, runoff capacity, electrical protection or retrieval criteria are unproven, the pool is not an authorized incident response route. Retain the battery in the safest validated containment arrangement under command rather than attempting an unsupported immersion.

22 Automation failure and protective system impairment

22.1 Engineering shall define the safe response to loss of power, communications, sensing, drive control, ventilation, cooling, drainage or destination availability. The response depends on the stage of transfer and the hazard. A universal instruction to keep moving or to stop immediately can be unsafe if it ignores the actual system design.

22.2 Use monitored interlocks and protective functions appropriate to the hazard and verify them during commissioning. Separate ordinary process control from the required protective capability where the design demands it. Access permissions shall prevent an operator from defeating a safety condition through an undocumented screen setting.

22.3 Test faults using safe simulation or approved commissioning methods that do not create an uncontrolled battery event. Verify alarm delivery, retained monitoring, remote command and the response to conflicting inputs. Record test conditions and limitations; a simulation that omits the load or power dependency shall not be claimed as a complete demonstration.

22.4 During a fault, maintain exclusion and incident command. Do not send a technician into a hazardous transfer route to reset a sensor or push a stalled pack. Recovery requires a separate plan addressing the actual battery condition, electrical and mechanical hazards and the response capability available.

22.5 If protection is impaired before an incident, assess restrictions on production, charging or storage and reduce the hazard where necessary. Record the impairment, compensating measures, owner and restoration deadline. Return to full operation only after the affected function is verified and the incident plan remains achievable.

23 Quarantine monitoring and specialist release

Quarantine continues until competent specialists apply the product and incident specific acceptance criteria. No universal number of hours, surface temperature or absence of flame in this manual establishes release.

Step / owner	Required action and evidence
1 Establish record	Identify the item, history, observed event, location, electrical uncertainty and command handover. Record the approved monitoring method and responsible personnel.
2 Monitor safely	Use the defined remote temperature, gas and other relevant observations. Record trends and instrument status; account for hidden heat and the limitations of surface measurements.
3 Respond to change	For renewed heating, venting, smoke, alarm or loss of monitoring, re-establish the required emergency response and zones. Do not approach to confirm a failed sensor by touch.
4 Review evidence	The designated battery and fire specialists assess sustained condition against the documented criteria and product instructions. Include the effects of cooling interruption and residual electrical energy.
5 Decide disposition	Authorize continued quarantine, specialist transport, examination or an approved waste route. Production reuse requires its own technical and quality decision and shall never be assumed after a fire event.
6 Transfer responsibility	Provide the receiving party with incident history, residual risks, monitoring needs and handling restrictions. Record acceptance, time, destination and custody before ending local responsibility.

Use Annex F for the log and disposition. Re-ignition risk shall be communicated even where the item appears quiet. A shipping label or collection booking is not technical release, and transport shall meet the applicable requirements for the actual damaged battery condition.

24 Firewater runoff and damaged battery waste

24.1 Preplan containment for firefighting water, pool contents, electrolyte, solvent and contaminated cleanup liquids. Identify drainage pathways, isolation points and storage capacity. Environmental controls shall support the response without delaying life saving actions or directing unprotected workers into the hazard to close a drain.

24.2 Treat incident runoff as potentially contaminated until characterized and released through the appropriate process. Cooling or immersion water may contain metals, organics and other hazardous substances. Do not discharge it to a sewer, surface water or ordinary reuse system solely because it looks clear or has cooled.

24.3 Damaged batteries, residues, absorbents, protective equipment and debris shall be identified, segregated and handled by competent personnel. Preserve battery identity and hazard history. Do not crush, dismantle, discharge or mix incident batteries into routine metal or plastic recycling.

24.4 Select packaging, storage and transport arrangements for the actual damaged or defective condition and relevant obligations. Provide the receiving organization with accurate information and confirm acceptance. A package suitable for an intact battery may not be suitable for a thermally damaged one.

24.5 Record quantities, samples, transfer documents and final destination evidence under the IAF Documents and Records Guide. Coordinate with IAF-MAN-SCE-001 for environmental disposition and material accounting. Recovery of useful material does not remove the need to control residual chemical, thermal and electrical hazards.

25 Decontamination cleanup and area release

25.1 Cleanup begins only after command authorizes the relevant access and technical specialists define remaining hazards. Assess atmosphere, structural condition, electrical systems, damaged batteries, contaminated surfaces and runoff. A fire out announcement does not automatically authorize ordinary production staff to clean the scene.

25.2 Develop a cleanup plan with competent personnel, protective equipment, respiratory controls, waste routes and decontamination arrangements. Prevent transfer of contamination to break rooms, offices, vehicles and medical areas. Dry sweeping or uncontrolled compressed air can redistribute hazardous residues and shall not be used without a suitable assessed method.

25.3 Clean and inspect response equipment according to its contamination and manufacturer instructions. Quarantine damaged or exposed protective equipment until evaluated. Record items requiring disposal, specialist cleaning or functional testing before reissue; appearance alone shall not establish serviceability.

25.4 Environmental and occupational hygiene specialists shall define the measurements and acceptance criteria for area reoccupation where needed. Include ventilation and hidden contamination pathways. A single generic gas test does not demonstrate that all surfaces, equipment and air are safe for normal work.

25.5 Release the cleaned area in stages where appropriate, with boundaries, permitted activities and remaining restrictions clearly marked. Record the evidence, authorized person and time. Keep battery quarantine and other residual hazard areas controlled even when neighbouring production areas are allowed to reopen.

26 Investigation recovery and production restart

26.1 Preserve relevant alarms, process data, battery identity, maintenance records and witness observations once life safety permits. Distinguish confirmed facts from hypotheses. Investigations shall examine equipment, process design, material condition, handling, protection systems, staffing and decision making rather than ending at an unsupported attribution to operator error.

26.2 The recovery plan shall identify damaged structures, utilities, machinery, controls, fire protection and affected product. Engineering shall inspect and test repaired systems; quality shall assess exposed materials and products; HSE and environment shall confirm the required access and release conditions. A building access decision is not product acceptance.

26.3 Before restart, verify detection, suppression, emergency controls, ventilation, electrical protection, evacuation routes and quarantine availability. Update risk assessments and operating instructions for any changed configuration. Do not restart production while the emergency capability on which its safe operation depends remains unavailable.

26.4 Annex H records readiness, restrictions and signatures from the relevant disciplines. The accountable site authority shall approve the actual operating scope and effective time. Temporary restart arrangements require a documented adequate control, expiry and review; production demand shall not close a critical unresolved action.

26.5 Share lessons with affected sites and IAF functions while protecting personal and confidential information. Assign corrective actions and verify sustained effectiveness through observation and testing. Review the incident plan and training after findings are accepted, and correct inaccurate performance or public statements where the evidence requires it.

27 Training exercises and competence assurance

27.1 The competence matrix shall distinguish evacuation awareness, first aid, electrical isolation and rescue, fire response, battery technical assessment, transfer operation, quarantine monitoring and incident command. Training attendance alone does not confer all these capabilities. Each role shall have a defined scope, practical assessment and review trigger.

27.2 Workers shall practice recognizing alarms, leaving by safe routes, accounting for people and reporting useful information. First aiders shall maintain practical adult CPR and AED skills through appropriate training. Electrical rescue and hazardous atmosphere entry require their own specialist capability and shall not be inferred from general first aid training.

27.3 Exercises shall test realistic constraints such as blocked routes, night shift staffing, missing visitors, failed communications, unavailable quarantine capacity and loss of power during transfer. Use safe simulation and training aids. Do not intentionally ignite solvents or provoke battery thermal runaway in an occupied production area for a drill.

27.4 Record alarm recognition, evacuation and accountability performance, command handover, information quality and protective system response. Timing is useful only alongside correct safe decisions; a fast drill that sends people through a hazard route is a failure. Debrief workers and responders and assign corrective actions.

27.5 Reassess competence after incidents, long absence, changed equipment or revised procedures. Verify the effectiveness of training in actual work and subsequent exercises. Keep medical suitability and personal information protected while making operational authorization and restrictions available to supervisors.

28 Controlled information and IAF interfaces

28.1 Maintain the emergency plan, contact list, hazard inventory, cause and effect matrix, equipment instructions and quarantine approvals as controlled documents. Provide accessible current copies during power or network loss. Test the availability of critical information in exercises and remove obsolete copies from emergency stations.

28.2 This manual interfaces with IAF-QM-001, IAF-MAN-GAA-001 for battery assembly, IAF-MAN-IHE-001 for industrial safety, IAF-MAN-OTC-001 for connected systems and IAF-MAN-SCE-001 for environmental recovery. The site shall reconcile shared responsibilities for shutdown, remote access, monitoring and restart.

28.3 Use the IAF Documents and Records Guide for revision, retention and disposal. Incident evidence shall be protected from alteration and subject to investigation or legal holds where required. Apply the Data Protection and Privacy, Whistleblowing, Appeals and Complaints, and Conflict of Interest policies to relevant records and reviews.

28.4 The competent IAF authority controls revisions under the Constitution and document management arrangements. Site owners shall assess issued changes, validate affected systems and brief personnel before changing operational practice. Publication status does not replace equipment commissioning, product specific technical acceptance or the responding authority's incident decisions.

28.5 Annexes A to H are practical templates. Complete local emergency numbers, routes, limits and authorities before deployment; blank forms are not an active response plan. This publication intentionally contains no named external standard references, while applicable law, equipment restrictions and current product specific emergency information remain binding on the adopted operation.

Annex A Emergency contacts and site readiness record

Complete and display the approved local version at emergency stations and command points. Verify contacts and backup arrangements at planned intervals and after personnel changes.

Readiness field	Entry to complete
Site identification	Site name / full address / emergency access gate / map ID: _____
Emergency numbers	Local emergency service: _____ Site alarm contact: _____
Command	On-duty commander / deputy / contact method: _____
Specialists	Electrical / battery / fire / first aid / environment leads: _____
Evacuation	Alarm method / safe routes / assembly points / assistance plan: _____
Accountability	Employee, contractor and visitor registers / reconciliation owner: _____
Responder information	Inventory / isolation maps / water supply / offline plan location: _____
System status	Detection / suppression / communications / quarantine impairments: _____
Verification	Checked by / date / corrections / next review: _____

Do not publish a blank contact sheet as an operational instruction. Confirm the actual external emergency number for the site jurisdiction. The person reporting shall give the access location, observed event and people at risk and shall follow dispatcher instructions from a safe position.

Annex B Scenario response planning matrix

Complete one detailed scenario sheet for each location and credible event. This matrix identifies the required planning decisions; actual zone distances, capacities and technical thresholds come from the approved site assessment.

Scenario	Required plan content
Solvent fire	Substance and quantity / ignition and vapour hazards / suitable media / safe isolation / drainage / responder capability.
Battery damage	Configuration and damage criteria / handling restriction / specialist assessment / stable suspect item quarantine route.
Heating or venting	Alarm and evacuation triggers / remote shutdown / gas hazards / escalation / eligibility limits for any engineered transfer.
Thermal runaway	Command and responder capability / exposures / cooling resources / propagation / containment in place or validated alternative.
Electrical injury	Known supplies and stored energy / safe isolation and rescue capability / first aid access / medical response and handover.
System failure	Power, sensor, route or destination failure / safe stage response / restrictions / specialist recovery plan.

Scenario approval

Location and scenario ID: _____ Technical basis and test evidence: _____ Product restrictions: _____ Command authority: _____ Drill evidence: _____. Record unresolved assumptions and prohibit the affected operation where a necessary protective capability is absent.

Annex C Incident command and decision log

Assign a log keeper in a safe location. Preserve actual times and sources and correct errors transparently. Do not delay emergency actions to complete this record.

Incident field	Entry to complete
Identity	Incident ID / date / location / initial report: _____
Command	Initial commander / transfer to responding authority / time: _____
People	Evacuated / accounted for / missing and last known location: _____
Hazards	Battery or chemical identity / observed state / electrical uncertainty: _____
Resources	Responders requested / arrival / water and specialist needs: _____

Log entry	Information to record
Time and source	Time: _____ Witness, alarm or technical source: _____
Observation	Observed condition and known uncertainty: _____
Decision	Action / reason / responsible authority: _____
Execution	Person or team / completion time / result: _____
Next review	Trigger or review time / outstanding need / handover: _____

Use controlled continuation pages for the event timeline. Record zone changes, remote shutdown, transfer decisions, cooling interruptions and monitoring failures. Distinguish what was observed from what was inferred. Protect personal medical details in the separate confidential casualty record.

Annex D Quarantine transfer authorization

Complete before initiating a transfer where the incident permits recording; pre-authorized automatic logic shall already have the same criteria documented in the validated plan. This is not permission for manual movement of an unstable battery.

Authorization field	Entry to complete
Item and condition	Battery ID / configuration / mass / observed event state: _____
Validated scope	System approval / product compatibility / allowed scenario: _____
Option assessment	Contain in place considered / reason transfer is safer: _____
Route	Exclusion / escape protection / load support / obstruction check: _____
Destination	Capacity / gas and fire controls / monitoring / drainage readiness: _____
System state	Power / sensors / interlocks / communications / fault response: _____
Authority	Commander / technical adviser / operator / time: _____
Execution	Start / observed faults / validated response / arrival confirmation: _____
Handover	Receiving authority / monitoring record / residual restrictions: _____

Any failed critical criterion blocks initiation. If a fault occurs during movement, apply the approved stage specific safe response. Do not bypass interlocks, push the load or send a technician into the hazard. Record a separate specialist recovery plan when normal transfer cannot be completed.

Annex E Conditional immersion system acceptance

This worksheet applies only to a proposed engineered quarantine pool or immersion system. It shall remain unavailable for incident use until every required technical acceptance is complete.

Acceptance field	Evidence to complete
Product compatibility	Exact battery range and configuration / product restrictions / technical agreement: _____
Scenario envelope	Damage state / energy and charge range / exclusions / evidence limits: _____
Alternative assessment	Dry containment and other options / decision basis: _____
Thermal and medium	Cooling basis / medium / capacity / levels / temperature control: _____
Electrical and gas	Residual energy / leakage / gas and pressure management / monitoring: _____
Mechanical and route	Load support / buoyancy / remote transfer / exclusion / fault behaviour: _____
Environment	Containment / overflow / runoff / sampling / disposal route: _____
Retrieval	Specialist access / release criteria / safe removal and maintenance: _____
Validation	Commissioning results / failure tests / training / approving authorities: _____

No universal immersion method is established by this manual. A product prohibition or an unproven electrical, gas, structural or environmental control prevents acceptance. Do not add salt or other chemicals as an improvised discharge method. Record the approved configuration and review it before any scope expansion.

Annex F Battery quarantine monitoring and disposition

Maintain a record for each item and controlled monitoring interval. The specialist plan shall define actual parameters, frequency, criteria and response; a quiet appearance is not sufficient release evidence.

Record field	Entry to complete
Identity and history	Battery ID / source / event / damage / arrival time: _____
Location and status	Quarantine position / configuration / electrical uncertainty: _____
Monitoring plan	Sensors / locations / frequency / criteria / instrument checks: _____
Observation entry	Time / readings with units / trend / gas or visual observations: _____
Change response	Alarm or failed monitoring / command notified / action and time: _____
Specialist review	Product criteria / sustained evidence / remaining hazards: _____
Disposition	Continue hold / specialist transport / examination / waste route: _____
Custody transfer	Receiving organization / acceptance / handling restrictions / time: _____

Attach time series and continuation logs. Record cooling interruptions and sensor limitations. The approving specialist shall document the basis for reducing controls and the residual re-ignition and electrical risks communicated to the next custodian. A preset timer alone shall not release the item.

Annex G Adult electrical injury first aid card

Local emergency number: _____ Site emergency contact: _____ AED location: _____
_____. Complete these fields before posting. This card applies to adults and begins with electrical scene safety.

Stage	Action
Before contact	Do not touch the person, equipment or water until competent personnel establish safe access. Raise the alarm and request electrical and medical help.
Safe assessment	Check responsiveness and normal breathing. Gasping is abnormal. Ask for the AED and follow dispatcher instructions.
No normal breathing	Start adult chest compressions at 100 to 120 per minute, about 5 to 6 cm deep, allowing recoil. Use a firm surface and minimize pauses.
Breaths if able	Trained and able rescuers use 30 compressions and 2 breaths. Otherwise provide continuous compressions and follow dispatcher guidance.
AED	Follow prompts; expose and dry the chest; keep everyone clear for analysis and shock. Use in a safe environment away from flammable atmosphere and standing water.
Handover	Continue as directed until professional takeover or other valid stop condition. Do not delay resuscitation for burns. All suspected high voltage exposure needs urgent medical assessment.

Do not use improvised poles or clothing for high voltage rescue. If the person is breathing normally, monitor closely and follow trained care and dispatcher advice, considering any fall or trauma. Record exposure details and care for medical handover; do not return the person to work because they appear recovered.

Annex H Recovery readiness and exercise review

Use the relevant part for incident recovery or a planned exercise. Record actual evidence and approvals; an exercise result does not certify that an untested engineering system will control a real battery event.

Recovery gate	Evidence and decision
Scene and people	Command release / access restrictions / medical follow-up: _____
Infrastructure	Structure / electrical systems / ventilation / machinery inspections: _____
Protection	Detection / suppression / emergency controls / exits / quarantine ready: _____
Environment	Atmosphere and cleanup acceptance / runoff and waste status: _____
Product	Affected stock and production disposition / quality release: _____
Restart	Approved operating scope / restrictions / signatures / actual time: _____

Exercise and learning review

Scenario and date: _____ Shift and participants: _____ Alarm and accountability results: _____ Command handover: _____ Tested system faults: _____. Record unsafe decisions and missing capability alongside response times.

Corrective action / owner / due date / verification method: _____. Exercise hazards shall be simulated safely. Do not ignite solvents or provoke thermal runaway on the operating factory floor. Recheck actions in a later exercise or suitable functional test and update the controlled plan.