

# ISOTEC ENERJI A.S.

## UTILITY-SCALE (GROUND-MOUNT) PV PLANT MOUNTING STRUCTURE SYSTEM — CORPORATE TECHNICAL SPECIFICATION

Single master technical specification for quotation, order and contract stages

Field	Value
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Prepared By	[.....]
Checked By	[.....]
Approved By	[.....]

Note: The term "mounting system" used in this document refers to the mechanical product family that is sold. Site installation, erection, labour, site equipment, HSE management and application responsibility are not undertaken by ISOTEC within the scope of this document; these are the responsibility of the EPC and/or the customer. Note: This specification takes effect upon mutual signing. It shall be interpreted together with the project-specific approved static calculation report, execution drawings, BOM / product list, installation manual and the separately issued warranty certificate.

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### 0. DOCUMENT CONTROL AND REVISION MANAGEMENT

This document is the unified revision that consolidates the corporate technical specification draft prepared for the sales stage and the mounting-system-focused corporate technical specification draft into a single binding master text. The aim is to make the technical text to be signed with the customer singular, clear, traceable and free of contradictions.

In this revision, provisions relating to site installation and erection services have in particular been updated in line with corporate policy; ISOTEC's role has been limited to project-specific design, mechanical system supply, technical documentation and product warranty.

Fields left blank are filled in on a project and contract basis. Changes made without a written revision are invalid. Use of earlier revisions or drafts is forbidden.

Rev.	Date	Change Description	Prepared By	Approval
[00]	20.04.2026	Creation and issue of the document	Quality Manager & Management Representative	General Manager
[..]	[.....]	[.....]	[.....]	[.....]

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## 1. PURPOSE

The purpose of this specification is to define, in a single document, the technical scope, party responsibilities, quality principles, delivery conditions, warranty references and technical-legal framework of the ground-mount PV mechanical mounting systems developed by ISOTEC Enerji A.S. and sold directly to the customer as a system.

This text has been prepared for use at the quotation, order and contract stages. Final manufacturing and shipment is carried out only on the basis of approved project inputs and a revision-controlled technical file.

## 2. SCOPE AND FIXED CORPORATE PRINCIPLE

This specification covers the project-specific mechanical design verification, material/coating selection, manufacturing, quality control, packaging, shipping, technical documentation and product warranty principles of fixed-angle ground-mount PV panel supporting systems.

- The scope includes primary and secondary steel/aluminium profiles, panel-holding clamps, bolt-nut-washer sets, mandatory interconnection parts, installation manual, warranty certificate reference and technical delivery file.
- PV modules, inverters, electrical infrastructure, site civil works, excavation-filling, reinforced concrete, fencing, cameras, lighting, MV/LV equipment, grounding network, regulatory proceedings and similar items outside the mechanical system are not a natural part of the scope of this specification.
- ISOTEC does not provide site installation or erection services. Erection, installation, labour, site organization, equipment, application, quality records and HSE application are the responsibility of the EPC and/or the customer.

Note: Critical fixed clause: The "mounting system" under this specification is a product definition; it is not a site installation service, erection labour or site commitment.

## 3. DEFINITIONS, INTERPRETATION RULES AND DOCUMENT HIERARCHY

### 3.1 Definitions

Term	Definition
ISOTEC	The seller/manufacturer responsible for project-specific engineering, manufacturing, supply and product warranty of the mechanical system.
Customer / Buyer	The natural or legal person receiving the quotation, placing the order or signing this specification mutually with ISOTEC.
EPC / Installer	The main contractor, subcontractor or customer organization physically performing the site installation and erection.
Mounting system	The mechanical product family designed to fix PV modules on site; it does not mean an installation service.
Full system supply	The supply of profiles, clamps, fasteners and mandatory mechanical accessories together with technical documentation.
ZM-coated steel	A steel class with continuous Zn-Al-Mg based coating within the scope of TS EN 10346.
Magnelis® / PosMAC®	Brand / commercial product names within the ZM class; they are not used synonymously with the generic class.
HDG	Hot-dip galvanized iron/steel parts obtained after fabrication.
EN 10204 Type 3.1	The inspection certificate of the raw material and/or product lot.
Design life	The targeted technical service duration based on engineering assumptions.
Warranty period	The commercial/technical commitment period defined in a separate warranty certificate; not the same as the design life.

### 3.2 Interpretation Rules

- In this document, "ZM" refers to the generic technical class. A brand name is used only if the lot actually shipped belongs to that brand.
- Information listed as corporate standard, typical, reference or starting value may be differentiated by a project-specific static solution.
- This document cannot be used as the sole basis for manufacturing without filling in blank fields and completing the final-page signature section.

### 3.3 Document Priority Order

- Mutually signed master contract / order confirmation / quotation and project-specific annexes
- Approved static calculation report, calculation notes and revisions
- Approved execution drawings, general layout and BOM / product list
- Installation manual, warranty certificate, maintenance instructions and delivery documents
- This corporate technical specification
- Catalogue, brochure, sample images, presentations and non-binding explanatory materials

Note: Documents higher in the above order take precedence over those lower. Only the most recently approved revision may be used on site.

## 4. PARTIES, ISOTEC CORPORATE TECHNICAL APPROACH AND RESPONSIBILITY MATRIX

ISOTEC adopts a ZM-coated high-strength steel approach as the corporate standard solution in ground-mount PV mounting structures. Customer requirements, project region, soil conditions, environmental corrosion impact, module geometry, static loads, manufacturing method and target service life are evaluated together; however, unless otherwise specifically agreed in writing, the primary material and coating approach is ZM-based.

Therefore, in the standard product family; ZM-coated high-strength cold-formed profiles, and brand-based Magnelis® / PosMAC® or equivalent ZM products are used as the basis. Mixed use of ZM and HDG elements in the same project is not a corporate standard solution and is not recommended. Use of post-fabrication hot-dip galvanized (HDG) steel elements is only possible with a special written agreement, project-specific engineering evaluation and definition in the quotation/contract.

ISOTEC operates with a direct system-sales approach to the customer. Under this approach, ZM-based profiles, clamps, fasteners, required mechanical accessories, installation manual, warranty certificate reference and technical delivery file are managed together. An HDG solution becomes part of this scope only when separately defined and backed by a special written agreement.

### 4.1 Corporate Standard Wall Thickness Ranges

The following values are corporate starting ranges frequently used during quotation preparation. Final cross-section and wall thickness are only finalized by project-specific static calculations.

Element Group	Corporate Starting Range	Typical Material Approach	Note
Column	2.50 – 3.00 mm	ZM-coated high-strength steel	The corporate standard solution is ZM-based; finalized with project-specific static verification.
Beam	2.00 mm	ZM-coated high-strength steel	The corporate standard solution is ZM-based; finalized with project-specific static verification.
Purlin	1.50 mm	ZM-coated high-strength steel	The corporate standard solution is ZM-based; finalized with project-specific static verification.
Brace	1.50 mm	ZM-coated high-strength steel	The corporate standard solution is ZM-based; finalized with project-specific static verification.

Note: This table is not a binding fixed product list. The binding values are only those in the approved BOM and static calculation report.

### 4.2 Fixed Corporate Site-Installation Policy

- ISOTEC does not provide site installation, erection, labour, site organization or installation services.
- Site application is carried out by the EPC and/or the customer, based on the installation manual, approved drawings and written technical revisions shipped with the product.
- ISOTEC's role on site is limited to written technical documents, product definition and, when required, written revision management.

- The EPC and/or the customer is responsible for workmanship quality, personnel competence, equipment suitability, HSE, site tolerances, torque records and application-related non-conformances.

### 4.3 Default Responsibility Matrix

Subject	ISOTEC	Customer / Employer	EPC / Installer
Project-specific supporting-structure static design	Included	Provides input / approves	Provides information
Soil survey, topography and site data	Used as input	Primary responsible	Provides information / applies
Profiles, clamps and fasteners supply	Included	Receives / inspects	-
Installation manual, technical delivery file and product documents	Included	Receives / archives	Uses on site
Site installation and erection	Excluded	Primary responsible / directs	Primary applicator
Labour, equipment, application, crane, driving, measurement	Excluded	Primary responsible	Primary applicator
HSE, site safety and site management	Excluded	Primary responsible	Primary applicator
Torque records, site quality records and installation control	Excluded	Primary responsible	Primary applicator
PV module installation and compliance with module manufacturer's requirements	Excluded	Primary responsible	Primary applicator
Product warranty	Included	Claim and record responsibility	Provides information for non-application-related cases
Installation / workmanship warranty	Excluded	Follows up per contract	Primary responsible

## 5. PROJECT INFORMATION AND DESIGN INPUTS

This specification does not keep project general information or static, environmental and soil inputs in repeated tables. All these data are managed on a per-project basis via the Project Summary Form / Report used by ISOTEC and referred to the customer. Final design, quantities, material selection, delivery time and warranty limits are finalized according to the approved inputs in that form/report.

### 5.1 General Project Information

Reference document: Project Summary Form / Report. Project name, customer / employer, EPC installer, site location, installed capacity, module layout, quotation / order references and other general project information are contained in that form/report.

### 5.2 Static, Environmental and Soil Data

Reference document: Project Summary Form / Report. Wind and snow inputs, seismic parameters, local soil class, pull-out / driving tests, topography, corrosion environment, soil/concrete contact and other site verification data are contained in that form/report.

### 5.3 ZM-Based Product / Profile Selection Table

The corporate standard and priority solution is the ZM-coated system. The following table is used as a preliminary technical matrix that can be selected / completed during project sales, quotation and order stages; the final selection is finalized through the approved static calculation report, drawings and BOM.

Element	Sheet Thickness	Steel Grade	Coating Grade	Project-Specific Selection / Note
Column	<input type="checkbox"/> 2.50 mm <input type="checkbox"/> 3.00 mm <input type="checkbox"/> Other: [.....]	<input type="checkbox"/> S350GD <input type="checkbox"/> S420GD <input type="checkbox"/> S450GD <input type="checkbox"/> Other: [.....]	<input type="checkbox"/> ZM310 <input type="checkbox"/> ZM430 <input type="checkbox"/> Other: [.....]	[.....]
Beam	2.00 mm (corporate fixed); Revision: [.....]	<input type="checkbox"/> S350GD <input type="checkbox"/> S420GD <input type="checkbox"/> S450GD <input type="checkbox"/> Other: [.....]	<input type="checkbox"/> ZM310 <input type="checkbox"/> ZM430 <input type="checkbox"/> Other: [.....]	[.....]
Purlin	1.50 mm (corporate fixed); Revision: [.....]	<input type="checkbox"/> S350GD <input type="checkbox"/> S420GD <input type="checkbox"/> S450GD <input type="checkbox"/> Other: [.....]	<input type="checkbox"/> ZM310 <input type="checkbox"/> ZM430 <input type="checkbox"/> Other: [.....]	[.....]
Brace	1.50 mm (corporate fixed); Revision: [.....]	<input type="checkbox"/> S350GD <input type="checkbox"/> S420GD <input type="checkbox"/> S450GD <input type="checkbox"/> Other: [.....]	<input type="checkbox"/> ZM310 <input type="checkbox"/> ZM430 <input type="checkbox"/> Other: [.....]	[.....]

Note: This table is for the ZM-based primary solution. Final profile/sheet thickness, steel grade and coating class become binding only through the approved static calculation report, project drawings, delivery scope and order confirmation.

#### 5.4 HDG Product / Profile Selection Table Subject to a Special Written Agreement

The HDG solution is not ISOTEC's default solution. The following table is filled in only if a special written technical and commercial agreement exists. Mixed use of ZM and HDG elements in the same project is not accepted unless separately and explicitly defined.

Element	Sheet / Wall Thickness	Base Steel / Sheet Grade	Coating / Galvanizing Criterion	Project-Specific Selection / Note
Column	<input type="checkbox"/> 2.50 mm <input type="checkbox"/> 3.00 mm <input type="checkbox"/> Other: [.....]	<input type="checkbox"/> S235JR <input type="checkbox"/> S275JR <input type="checkbox"/> <input type="checkbox"/> S355JR <input type="checkbox"/> Other: [.....]	TS EN ISO 1461 / project-specific criterion: [.....]	[.....]
Beam	2.00 mm (reference); or project-specific: [.....]	<input type="checkbox"/> S235JR <input type="checkbox"/> S275JR <input type="checkbox"/> <input type="checkbox"/> S355JR <input type="checkbox"/> Other: [.....]	TS EN ISO 1461 / project-specific criterion: [.....]	[.....]
Purlin	1.50 mm (reference); or project-specific: [.....]	<input type="checkbox"/> S235JR <input type="checkbox"/> S275JR <input type="checkbox"/> <input type="checkbox"/> S355JR <input type="checkbox"/> Other: [.....]	TS EN ISO 1461 / project-specific criterion: [.....]	[.....]
Brace	1.50 mm (reference); or project-specific: [.....]	<input type="checkbox"/> S235JR <input type="checkbox"/> S275JR <input type="checkbox"/> <input type="checkbox"/> S355JR <input type="checkbox"/> Other: [.....]	TS EN ISO 1461 / project-specific criterion: [.....]	[.....]

Note: An HDG solution is valid only with a special written agreement. Even if this table is filled in, the ZM-based primary solution does not automatically cease to apply; the binding solution is separately defined in the quotation/contract annex and the approved technical file.

## 6. SUPPLY SCOPE, TECHNICAL DELIVERY SCOPE AND ITEMS OUT OF SCOPE

Unless otherwise stated in writing, this specification is arranged under a full-system mechanical mounting structure supply approach. "Full system" refers to the mechanical supporting profiles together with the fasteners required to assemble those profiles in accordance with the project, and the related technical documentation.

Item	Status	Description
Columns, beams, purlins, braces, connection plates and project-specific mechanical components	Included	Supplied within the approved BOM.
Panel holders (mid/end clamps) and required mechanical accessories	Included	Delivered appropriately for the shipped system variant.
Bolts, nuts, washers and required connection sets	Included	Supplied as a set mechanism needed for system operation.
Project-specific static calculation report and execution drawings	Included	Only for the mechanical system within ISOTEC's scope.
EN 10204 Type 3.1 certificates and technical delivery file	Included	Provided as a lot-matched document set.
Installation manual and warranty certificate reference	Included	The warranty certificate is a separate document.
Packing list / delivery note / shipping labels	Included	Mandatory for delivery control.
Site installation and erection service	Out of scope	Not provided by ISOTEC; responsibility of the EPC and/or customer.
Site labour, equipment, crane, pile driver, application, measurement and alignment	Out of scope	Responsibility of the EPC and/or customer.
Site organization, HSE management, site quality records and torque records	Out of scope	Responsibility of the EPC and/or customer.
PV module installation and compliance with module manufacturer's requirements	Out of scope	Responsibility of the EPC and/or customer.
Soil survey, pull-out/driving tests, topographic measurement	Out of scope	Managed as a separate service / customer-EPC scope.
Excavation, earthworks, reinforced concrete, roads, fencing, security, lighting and similar site works	Out of scope	Falls outside the mechanical system supply.
PV modules, inverter, transformer, AC/DC cables, panels, SCADA, MV/LV equipment	Out of scope	These are other components of the power generation plant.
General grounding network, lightning protection, regulatory applications and acceptance processes	Out of scope	Not ISOTEC's responsibility unless separately contracted.

Note: Scope expansion is possible only by separate written agreement. Site installation service is not deemed to have been added under this specification.

## 7. REFERENCE STANDARDS, REGULATIONS AND CONFORMITY PRINCIPLES

Design, manufacturing, material selection, quality control, delivery and installation-interface rules are evaluated according to the currently in-force edition of the relevant standard and the project-specific approved technical file. Project- or customer-specific conditions may not go below the minimum technical level set out in this text in terms of life and property safety.

Reference	Subject	Manner of Application
TS EN 1090-1	Conformity assessment of supporting elements	Applied, to the extent applicable, as the basis for the product/manufacturing conformity declaration.

Reference	Subject	Manner of Application
TS EN 1090-2	Technical requirements for steel structures	The main standard for manufacturing, tolerance, corrosion protection, workmanship and conformity control; EXC2 level is adopted as basis.
TS EN 1090-3	Technical requirements for aluminium structures	Applied where aluminium structural components, rails or supporting elements are used.
TS EN 10346	Continuous hot-dip coated steel flat products	Applied for technical delivery and classification of ZM, Z and similar continuously coated steels.
TS EN ISO 1461	Hot-dip galvanizing coatings	Mandatory acceptance criterion for parts with post-fabrication HDG applied.
TS 13891	Metal structures for utility-scale PV plants	Considered as the product and application framework for ground-mount PV supporting systems.
TS EN 10051	Dimensional and shape tolerances of hot-rolled uncoated steels	Used, to the extent applicable, as a raw material delivery requirement for uncoated hot-rolled flat products.
TS EN 1991-1-3 / TS EN 1991-1-4	Snow and wind effects	Used for determining the static loading principles.
TS EN 1993 series	Design of steel structures	Applied in section, connection and strength calculations.
TS EN 1998 series and the in-force Turkish Earthquake Regulation (TBDY)	Earthquake-resistant design	Jointly considered in evaluating seismic effects.
TS 498 and, where applicable, TS 500	Building loads and reinforced concrete principles	Applied if a reinforced concrete foundation or anchor solution is involved.
TS EN ISO 9001:2015	Quality management system	Used as the basis for process control, record management and traceability framework.
EN 10204 Type 3.1	Inspection certificates	Required for raw materials and the related lot documents.
TS EN ISO 3506 and related fastener standards	Stainless steel fasteners	A2-70 / A4-80 and equivalent stainless fasteners are referenced.
Module manufacturer's installation manual and datasheet	PV module interface	Binding input for clamp zone, support spacing and installation constraints.
Applicable Turkish Code of Obligations, Turkish Commercial Code and contract law provisions	Commercial and legal framework	Jointly evaluated with the mutually signed contract and this specification.

Note: In case of conflict between standards, without prejudice to the contract and the approved project documents, the more protective requirement shall prevail in terms of safety.

## 8. DESIGN PRINCIPLES AND ENGINEERING RULES

During pre-manufacturing project work, ISOTEC designs its products project-specifically based on the required static calculations, the in-force laws, regulations and standards, together with other technical analyses. The design is a separate engineering output for each project; catalogue information or sample drawings alone do not constitute design approval.

### 8.1 General Design Approach

- Load combinations are built to cover self-weight, module load, wind, snow, earthquake, temperature and installation/site effects.

- Geometry, span, deflection, connection behaviour, local buckling and connection strength are jointly evaluated.
- The clamp zone, support spacing and installation constraints set out by the panel manufacturer are mandatory design inputs.
- Geotechnical data, topography and site constraints provided by the customer are inseparable parts of the design.
- If site conditions or customer requirements necessitate a change, the change cannot be applied without a written engineering revision.

## 8.2 System Model and Configuration Selection

ISOTEC's ground-mount product family includes single-column or double-column fixed-angle systems, vertical or horizontal module layouts, and steel-steel or steel-aluminium combinations. The appropriate model is determined according to soil hardness, number of columns, logistics, module size, rack geometry, site slope and static requirements.

- ISOGROUND ONE-type solutions may be preferred on hard soils to reduce column count or optimize site layout.
- ISOGROUND TWO-type solutions may be preferred for double-column rack geometries requiring higher strength.
- In both approaches, the final model name, variant code and parts set are defined in the approved quotation and delivery file.

## 8.3 Soil and Anchoring Principles

The fixation of columns to the ground may be carried out by ramming, core drilling, chemical anchorage, mechanical anchorage, starter bars, concrete block/foundation or another project-specific method. The choice is determined by soil survey, suitability for driving, site slope, access, underground obstacles and customer expectations.

- If soil data are insufficient, the quotation may be prepared with provisional assumptions; final static calculation and quantities are finalized after site verification.
- When pull-out/driving tests or site trial applications are required, test locations and acceptance criteria are defined project-specifically.
- For solutions on concrete or with anchors; studs, anchor bolts, chemical cartridges, hole depth and edge distance are subject to separate engineering calculation.

## 8.4 Corrosion Environment and Material Selection Logic

ISOTEC's corporate standard solution is ZM-coated high-strength steel systems. The correct engineering decision is evaluated together with environmental aggressiveness, element geometry, wall thickness, weld density, soil contact and maintenance regime; however, unless otherwise agreed in writing, the starting point for coating selection is a ZM-based solution.

Site / Element Condition	Preferred Approach	Engineering Note
Corporate standard project solution	ZM-coated high-strength steel	The default and recommended primary solution; finalized with project-specific static and environmental inputs.
Mixed use of ZM + HDG	Not recommended / not default	May be considered only when explicitly defined via a special written technical and commercial agreement.
Full HDG project solution	Only by special written agreement	Separately defined for thick, welded or project-specific fabrications; not the corporate starting solution.

Site / Element Condition	Preferred Approach	Engineering Note
Coastal / aggressive industrial environment	Priority ZM; special evaluation if required	Corrosion class, water-retention detail and maintenance regime are the basis; the HDG decision is not made automatically.
Interfaces with aluminium / stainless contact	Galvanic couple control mandatory	Insulation, drainage and interface detail must be resolved jointly.

Note: Design life and commercial warranty period are not the same concept. Design life is an engineering target; warranty is a commercial commitment limited to the scope and conditions of the warranty certificate.

## 9. MATERIAL, COATING AND FASTENER REQUIREMENTS

Raw materials and components are selected based on approved project data. The quotation provided to the customer and the shipping file clearly state the material class, coating type, fastener class and any brand/commercial product family used.

### 9.1 ZM-Coated Steels

Within ISOTEC, "ZM-coated steel" is used as the corporate technical expression. The terms "Magnelis®" and "PosMAC®" are used as brand names only for lots in which the relevant brand's product has actually been supplied. The corporate standard and priority solution is ZM-based; brand-specific performance or warranty claims are limited to the relevant brand, lot and certificate only.

- Typical base steel classes: S350GD, S420GD, S450GD or project-specific approved equivalent classes within the scope of EN 10346.
- Typical coating classes: ZM310, ZM430; higher or special classes are applied only when defined by manufacturer documentation and contract. The corporate starting and recommended solution is ZM-based.
- All specific performance claims regarding cut-edge, hole and scratch behaviour are valid only for the brand and lot shipped. Any deviation from the ZM solution must be separately defined in writing.

### 9.2 HDG Steels

Post-fabrication hot-dip galvanized elements are protected in accordance with TS EN ISO 1461. However, this approach is not ISOTEC's default solution; it is applied only when separately defined under a special written agreement, project-specific engineering and commercial evaluation.

- Typical base steel classes: S235JR, S275JR, S355JR or project-specific approved equivalent classes. The final class is separately defined only for HDG solutions within the scope of a special written agreement.
- Galvanizing thickness and acceptance are evaluated based on the part's wall thickness and the relevant criteria in the standard. HDG selection cannot be automatically interpreted as an alternative to the ZM solution.
- Hole / closed volume / vent-drain details require manufacturing suitable for the galvanizing process. Any mixed ZM and HDG use scenario must be separately defined in writing; if not defined, it is not accepted.

### 9.3 Aluminium Elements

Rails, clamps, specific supporting or intermediate parts may be produced from EN AW 6063-T66, EN 6005 or project-specific approved equivalent aluminium alloys. When aluminium components are used, the requirements of TS EN 1090-3 and/or TS EN 1999 are considered according to the element's function.

### 9.4 Fasteners and Accessories

- In the standard approach, bolts, nuts and washers are selected from stainless A2-70 / A4-80 or project-specific approved zinc-flake coated high-strength classes.
- Panel-holding clamps and similar parts are selected from high-strength aluminium alloys according to the project-specific product family.
- Fasteners are applied as a bolt + nut + washer assembly, with the direction/order defined in the installation manual.
- In slotted connections, washer size and placement direction are applied per the installation manual and detail drawing.
- Loosening, vibration, anti-seize lubrication, galling and bimetallic corrosion risks are controlled based on material type.

## 9.5 Galvanic Couple and Interface Control

At points where steel-aluminium, stainless-carbon steel or different coating systems come into contact, details are applied to reduce galvanic couple formation. Where necessary, intermediate insulators, bimetallic parts, appropriate coatings, gaskets or water-drainage details are applied.

## 9.6 Coating Damage and Repair Materials

For local coating damage that may occur on site or during production, an appropriate repair procedure and repair material suitable for the relevant coating system are used. No local treatment such as grinding, sanding, welding, cold galvanizing spray or similar may be applied outside ISOTEC-approved procedures.

# 10. MANUFACTURING, WORKMANSHIP, TOLERANCES AND TRACEABILITY

Manufacturing processes are carried out with a controlled production discipline based on EN 1090-2 EXC2 technical level. Process selection may cover coil de-coiling, cut-to-length, hole-making, roll-forming, welded fabrication where required, surface protection and packaging.

## 10.1 Manufacturing Rules

- All raw materials and semi-products are identified according to the ordered grade and managed so as to prevent mixing.
- Cutting, drilling and forming operations are performed with methods that do not damage the coating, profile geometry or load-bearing capacity.
- For pre-coated products, unauthorized heat treatment, uncontrolled welding or site operations that excessively damage the coating are not permitted.
- Parts must not have burrs, sharp edges, dents, bending errors, hole misalignment or deformation that would prevent assembly.
- All components shipped to site are marked with lot, batch or ERP-compatible labels for traceability.

## 10.2 Tolerances

Raw-material tolerances are evaluated per the relevant product standard; finished-part and assembly tolerances are evaluated per the approved drawings, EN 1090-2 and project-specific installation manuals.

Control Parameter	Reference / Default Rule	Description
Hole-axis tolerance	Relevant product standard and approved drawing	Applied as the manufacturing control criterion unless otherwise specified in the drawing.
Part length, width and straightness	Relevant product standard and approved drawing	Controlled per the coated/uncoated product standard and section type.

Control Parameter	Reference / Default Rule	Description
Package/lot traceability	Mandatory	Every package has a lot/certificate match.
Site installation tolerances	Project-specific installation manual	Column, rack and application tolerances are finally given in the installation manual.

### 10.3 Traceability and Records

As required by the quality management system, ISOTEC ensures identification and traceability throughout production and delivery to the extent required. Certificate number, lot matching, delivery list, quality control records and, where required, revision history are maintained.

Note: The customer is responsible for storage, mixing prevention and protection of labels after delivery. For unlabelled or mixed-up material, traceability may be limited retroactively.

## 11. QUALITY MANAGEMENT, INSPECTION AND TEST METHODS

ISOTEC's quality approach relies on incoming quality control (IQC), in-process quality control (IPQC), final quality control (FQC) and project-specific verification steps. The aim is to ensure not only raw material conformity but also that the correct part is shipped with the correct coating and correct documentation.

Stage	Control Subject	Method	Frequency	Record	Acceptance / Action
IQC	Raw material quality and coating class	EN 10204 3.1 document check, order comparison	Every lot	Certificate control record	Reject/quarantine lot if non-conforming
IQC	Mechanical properties	Certificate check; tensile testing if needed	Every lot / suspicious lot	Test report	CAPA and reject if non-conforming
IQC	Chemical composition	Certificate check; OES verification if needed	First approval / dispute / critical project	Analysis report	Reject lot or re-evaluate on deviation
IPQC	Profile geometry and hole placement	Dimensional control with measuring tool	Planned sampling	Process control form	Out-of-tolerance parts are separated
IPQC	Coating surface and damage control	Visual inspection	Throughout the process	Process control form	Damaged parts repaired/rejected
IPQC	Coating thickness / mass verification	Appropriate measurement method or external laboratory	First approval / dispute / critical project	Test report	Lot blocked if non-conforming
FQC	Part count, lot, label and package	Counting and shipment check	Every shipment	Packing list	Missing/mixed lots are not shipped
FQC	Final visual and dimensional conformity	Visual inspection and control measurement	Every shipment	Final inspection form	Non-conformances are separated
Project-specific	Pull-out/driving / anchorage verification	Site test	Per contract	Site test report	Design revision if required
Project-specific	Clamp / accessory performance	In-house test / external report / conformity document	On request	Test report	Submitted in the technical file

## 11.1 Non-Conformance Management

- Non-conforming products are separated, labelled and recorded to prevent mixing.
- Correction, scrapping, conditional acceptance or rework decisions are made by authorized technical personnel.
- Non-conformances or deviations affecting the customer are notified in writing and, where required, a revision is issued.

## 11.2 Third-Party Verification

Where required by customer request, contract or critical project conditions, additional test services may be obtained from independent and accredited laboratories. The scope, sampling method, responsibility and cost of these additional tests are explicitly defined in the contract.

## 12. TECHNICAL DELIVERY, PACKAGING, SHIPPING AND STORAGE

Products are packaged so as to be separable, identifiable and safely storable on site. The packaging method may vary based on part length, profile type, coating structure, anchorage/accessory set and shipping mode.

### 12.1 Packaging and Labelling

- Packages carry lot/batch labels, part identification, quantity and, where required, project code.
- Steel profiles are shipped with wooden pallets, separators, steel banding or equivalent safe packaging elements that protect the coating.
- Fasteners and small parts are labelled in box/bag/set logic that prevents mixing.
- Products of different revisions or different material classes are not mixed in the same package.

### 12.2 Storage and Preservation

- Material must be stored on flat and safe ground, free from water pooling, heavy dirt and impact.
- For coated products, the shipping surface protection cannot be interpreted as a permanent outdoor storage solution.
- After packages are opened, labels must be preserved, lot mixing must be prevented, and fasteners must not be left unattended in the open.

### 12.3 Technical Delivery File

Document	Status	Minimum Content	Note
Approved static analysis and design report	Mandatory	Loads, combinations, profile and connection verifications	Only for the mechanical system within ISOTEC's scope
Execution / general layout drawings	Mandatory	Rack types, reference dimensions, arrangement	Project-specific, revision-controlled
BOM / product list	Mandatory	Part code, quantity, material class	Constitutes the basis of the delivery scope
EN 10204 3.1 certificates	Mandatory	Raw material quality and coating information	Lot-matched
Installation manual	Mandatory	Step-by-step erection, torque table, tolerances	Matches the shipped variant
Warranty certificate	Mandatory	Warranty period, conditions, out-of-scope cases	May be project/product-specific
Maintenance instructions	Mandatory	First 6-month and annual maintenance requirements	Related to warranty conditions

Document	Status	Minimum Content	Note
Packing list / delivery note	Mandatory	Per-shipment quantities and package identification	For delivery control
Repair procedure	Where applicable	Site cut/damage repair limits	Submitted before installation
Additional test reports	On request / contract	Pull-out, laboratory, clamp tests, etc.	Depends on contract scope
EN 1090 / conformity documents	Where applicable	CE label / declaration of conformity	Per product family and contract scope

## 13. INSTALLATION INTERFACE, SITE APPLICATION RULES AND EPC / CUSTOMER RESPONSIBILITIES

This section does not change the fact that ISOTEC does not provide site installation services. Its purpose is to define the technical interface rules mandatory for the EPC and/or customer so that the shipped system can be correctly applied on site.

Note: Fixed corporate clause: Site installation, erection, labour, personnel, equipment, HSE, quality records, torque records and site acceptance are the responsibility of the EPC and/or customer.

### 13.1 General Site Rules

- All mechanical operations on site must be performed in exact accordance with the approved project drawing, the installation manual for the shipped product variant, and written ISOTEC revisions.
- Unauthorized cutting, drilling, welding, grinding, heating, coating-damaging intervention or operations that would modify the supporting system are not permitted on site.
- Modules are fixed only from the clamp zones permitted by the panel manufacturer and in the method prescribed by the manufacturer.
- Drain, mounting or manufacturer-restricted holes on the module may not be used for installation purposes without the manufacturer's written consent.
- Different bolt class, different washer, different clamp, different profile or unapproved third-party components may not be used.
- If the need for a solution change arises due to site conditions, the application cannot be changed without a written ISOTEC technical revision.

### 13.2 EPC and/or Customer Obligations

Obligation	Responsible Party	Minimum Requirement
Site preparation and setting-out	EPC / Customer	Marking axes, levels and layout per the approved drawing.
Personnel competence and equipment suitability	EPC / Customer	Use of competent personnel, calibrated equipment and safe work tools.
HSE and site safety	EPC / Customer	Compliance with in-force regulations, site rules and risk assessment.
Torque application and records	EPC / Customer	Tightening with calibrated torque wrench and, where required, recording.
Site quality records	EPC / Customer	Keeping records of installation, alignment, anchorage, torque and non-conformances.
Storage and prevention of lot mixing	EPC / Customer	Preservation of shipping labels; prevention of inappropriate outdoor storage.
Compliance with panel manufacturer requirements	EPC / Customer	Compliance with datasheet, clamp zone and module installation constraints.

### 13.3 Default / Typical Site Tolerances

The final binding site tolerances are set out in the installation manual and project-specific drawings. The following values are corporate reference information only; if project documents give different values, the project documents take precedence.

Parameter	Typical Value / Range	Note
Column plan location	approx. $\pm 30$ mm	Final value verified per installation manual.
Application / rack angle tolerance	approx. $\pm 2^\circ$	Verified depending on site slope and variant.
Column verticality tolerance	maximum 1% unless project states otherwise	Controlled based on driving or anchorage method.
Axis deviation	$\pm 10$ mm unless project states otherwise	Setting-out accuracy is the EPC and/or customer's responsibility.

### 13.4 Torque and Connection Control

The binding torque table is contained in the installation manual for the shipped product variant. The following values are for typical reference only.

Connection	Connection Class	Typical Torque Value	Note
Structural M10 steel bolt	8.8 / zinc plated	48 – 50 N·m	Typical value for column-beam, brace and similar structural connections.
Structural M10 stainless bolt	A2-70	38 – 42 N·m	Typical value for stainless connections.
Structural M12 steel bolt	8.8 / zinc plated	80 – 90 N·m	Typical value for some structural connections.
Panel end / mid clamp bolt	Allen / clamp connection	14 – 18 N·m	Verified per panel frame and clamp type.

- Use of a calibrated torque wrench is mandatory; uncontrolled tightening is not accepted.
- Loose, over-tightened or damaged connections must be corrected immediately by the EPC and/or customer.

### 13.5 Grounding and Electrical Continuity Interface

This specification primarily governs the mechanical system supply. The plant-wide grounding network, conductor cross-section, lightning protection and electrical measurements are the responsibility of the EPC and/or customer. The mechanical details to be used for electrical continuity on the mechanical system may be separately defined based on project scope.

## 14. INSPECTION, DELIVERY ACCEPTANCE, CHANGE AND NON-CONFORMANCE MANAGEMENT

Acceptance does not mean only the arrival of material on site. Technical acceptance is the evaluation of the shipped material against the approved documents, delivery list, certificate set and visible conformity criteria.

### 14.1 Delivery Acceptance

- At delivery, the customer verifies the number of packages, visible damage, label conformity and document set.

- Transport damage, missing packages or visible non-conformance is recorded and written notice is given to ISOTEC within the notification period defined in the contract.
- The notification period for technical non-conformances that are not visible is separately set in the contract; if not set, written notice must be given within a reasonable technical review period.

## 14.2 Technical Acceptance and Distinction from Site Application

- ISOTEC technical acceptance concerns the conformity of the product and the delivery file. Site installation workmanship, installation quality and EPC/customer application are not the subject of this acceptance.
- Errors arising from site application, non-conforming tolerances, missing torque records or installation contrary to the module manufacturer's requirements are the responsibility of the EPC and/or customer.
- If a change in design becomes unavoidably necessary during application, a written ISOTEC revision must be obtained to preserve product liability.

## 14.3 Change Management

- All changes relating to technical drawings, BOM, static calculations, product configuration or site solution are recorded and approved by authorized personnel.
- If module type, layout, wind/snow data, soil report, corrosion class or foundation method change, the entire technical file is reviewed and revised where required.
- When a revised document is issued, the old version is cancelled; only the last approved revision may be used on site.

## 14.4 Non-Conformance Classification and Closure

Non-Conformance Type	Definition	Typical Action
Critical	Deviation directly affecting safety, static integrity, correct installation or warranty validity.	Quarantine, part replacement, written technical evaluation.
Major	Deviation that does not prevent function but definitely requires correction and recording.	Correction / segregation / conditional acceptance decision.
Minor	Visual or minor correction-requiring deviation with no effect on function and safety.	Record and local correction if needed.

# 15. WARRANTY, MAINTENANCE AND LIABILITY LIMITS

Warranty terms are set out in a separate "Warranty Certificate". This specification does not replace the warranty certificate; however, it defines the technical background of the warranty certificate, the warranty preconditions and the liability limits.

## 15.1 Standard Product Warranty Approach

- The standard product warranty period for ISOTEC ground-mount mechanical systems is 12 years unless stated otherwise in the project-specific warranty certificate.
- Longer or project/coating-specific extended warranty takes effect only through a separately issued written warranty certificate and/or contract annex.
- Design life, corrosion durability expectation and commercial warranty are not the same concepts; each is evaluated separately.

## 15.2 Warranty Scope and Distinction from Site Installation

- ISOTEC's warranty liability is limited to the material, manufacturing and contractually defined technical scope of the mechanical products it has supplied.
- Since site installation and erection are performed by the EPC and/or customer, installation workmanship, site application error, missing torque, alignment defect, module breakage, improper storage on site and HSE violations are not within the warranty scope.
- Installation contrary to the installation manual, approved project or panel manufacturer's installation requirements may affect the product warranty in whole or in part.

## 15.3 Warranty Claim Procedure

- A warranty claim must be notified to ISOTEC in writing, together with proof of purchase/delivery, within 14 days of detection of the defect.
- ISOTEC has the right to verify the claim by photograph, video, record, measurement, on-site inspection or independent test.
- The basic obligation under a confirmed warranty claim is repair and/or replacement of the defective component with an equivalent. Indirect damages, energy generation loss and items outside the project are not covered unless separately undertaken.

## 15.4 Cases Out of Warranty

- Site application contrary to the installation manual, approved static solution or panel manufacturer's requirements.
- Maintenance, drilling, cutting, welding, grinding or modification performed by unauthorized third parties.
- Improper transport, storage, stacking, site water contact, chemical contact or prolonged improper outdoor exposure.
- Additional loads exceeding the static calculation, unauthorized equipment additions, or subsequent structural modifications of the system.
- Site workmanship defects, loose connections, incorrect torque, wrong module clamp zone, misaligned installation or EPC/customer-sourced installation errors.
- Natural disaster, vandalism, human/animal-caused external damage or force majeure events.
- Failure to perform or present periodic maintenance and inspection records.

## 15.5 Maintenance Obligations

Periodic maintenance / inspection is recommended at the end of the first 6 months and at least once a year thereafter; where the warranty certificate requires more frequent maintenance, that period applies. The organization and recording of this maintenance is the responsibility of the EPC and/or customer.

Inspection Interval	Minimum Inspection Items	Record
End of 6 months	Visual check, connection loosening, coating damage, alignment, required torque checks	Maintenance form / photo / site record
Annual	Corrosion signs, bolt and clamp condition, anchorage/column stability, unauthorized modification check	Maintenance form / photo / site record
Post-damage	On-site technical inspection and corrective action evaluation	Service form / non-conformance record

## 16. COMMERCIAL AND LEGAL PROVISIONS

This specification is an inseparable technical annex of the quotation, order confirmation and/or commercial contract to be signed. Commercial variables are filled in per project in the table below.

Commercial / Legal Parameter	Project / Contract Data
Quotation validity period	[..... business days / calendar days]
Delivery time	[.....]
Delivery form / Incoterm	[.....]
Partial shipment	[allowed / not allowed / conditional]
Payment plan	[.....]
Warranty start event	[invoice / shipment / delivery / other]
Dispute resolution venue / method	[.....]
Competent court / enforcement office	[.....]
List of documents annexed to the contract	[.....]

### 16.1 Intellectual Property and Confidentiality

- The drawing logic, product codes, profile geometries, calculation approach, know-how, installation methods and revisions in this document fall within ISOTEC's intellectual and industrial property rights unless agreed otherwise in writing.
- The customer may use this technical file only for the project in question; it may not be transferred to third parties, copied or used in other manufacturing without written permission.

### 16.2 Liability Limits

- ISOTEC's liability is limited to the mechanical system scope defined in the contract.
- PV modules, electrical equipment, site civil works, general grounding, regulatory acceptance processes, site installation and erection workmanship are not ISOTEC's responsibility unless separately undertaken.
- Technical and commercial risks arising from missing/incorrect project data provided by the customer or EPC, and from unapproved site changes, belong to the relevant party.

### 16.3 Force Majeure

- Events beyond the parties' control that directly affect performance are evaluated as force majeure through written notice and impact analysis.
- In force-majeure cases, the effects on duration, scope and obligations are managed by separate written agreement.

### 16.4 Initials, Signatures and Entry Into Force

- It is recommended that each page of this specification be initialed by the parties and the final page be signed/stamped.
- The document does not enter into force until blank fields are completed and the signature section is fully executed.

## 17. FINAL PROVISIONS, MUTUAL ACCEPTANCE AND SIGNATURE

This specification has been read, understood and accepted by the parties as a project-specific technical annex. It is the single master technical specification that supersedes previous drafts prepared for the same transaction.

The parties accept that this specification expressly contains the fixed corporate principle that ISOTEC does not provide site installation or erection services, that site application is the responsibility of the EPC and/or customer, and that warranty evaluation will be made in accordance with this distinction.

The project-specific static report, execution drawings, delivery document list, installation manual, maintenance instructions, warranty certificate and any special annexes are inseparable parts of this specification.

SELLER / DESIGNER / SUPPLIER	CUSTOMER / BUYER
Trade Name: ISOTEC Enerji A.S.; Authorized Name: [.....]; Title: [.....]; Date: [__ / __ / ____]; Stamp / Signature:	Trade Name: [.....]; Authorized Name: [.....]; Title: [.....]; Date: [__ / __ / ____]; Stamp / Signature:
Optional installer information area (signature not mandatory)	
EPC / Installer: [.....]; Authorized Name: [.....]; This area is for information only; it does not change the two-party signature structure of this specification.	

## ANNEXES

### ANNEX-1 | Pre-Quotation / Pre-Order Data Completion Checklist

- Has the approved module datasheet been shared?
- Is the location, coordinates and parcel information clear?
- Is a soil survey and/or site test plan available?
- Have wind, snow and seismic design inputs been approved?
- Are the corrosion environment and soil/concrete contact conditions clear?
- Has any special written HDG request and/or brand requirement outside the corporate ZM standard been clearly defined?
- Are the delivery location, delivery mode and documentation expectations clear?
- Is the EPC/installer information and the split of responsibility clear?
- Has the warranty start event and maintenance model been defined?

### ANNEX-2 | Example Inspection and Test Plan (ITP) Summary

Stage	Control Subject	Method	Frequency	Record
IQC	Raw material quality / coating / document check	3.1 certificate, order comparison	Every lot	Certificate control record
IPQC	Profile geometry and hole placement	Dimensional control	Planned sampling	Process control form
IPQC	Surface and coating damage	Visual inspection	Throughout the process	Process control form
FQC	Part count, lot, label and package	Counting and shipment control	Every shipment	Packing list
FQC	Final visual and dimensional conformity	Visual inspection and control measurement	Every shipment	Final inspection form
Project-specific	Pull-out / anchorage verification	Site test	Per contract	Site test report

### ANNEX-3 | Technical Delivery and Shipment Acceptance Checklist

- 9744; Approved static analysis and design report
- 9744; Execution drawings / general layout
- 9744; BOM / product list

- EN 10204 Type 3.1 certificates
- Installation manual (matching product variant)
- Warranty certificate
- Maintenance instructions
- Packing list / delivery note
- Additional test reports if any
- Repair procedure / tolerance document if any
- Package count, label and visible damage check

#### ANNEX-4 | Periodic Maintenance Checklist

- Any loosening in fasteners?
- Any visible corrosion, coating damage or impact mark?
- Are column, anchorage and rack alignment preserved?
- Are clamp and module contact zones in correct condition?
- Any unauthorized drilling, cutting, welding or additional component?
- Are maintenance date, inspector and observations recorded?

#### ANNEX-5 | Default Responsibility Matrix Summary

Subject	ISOTEC	Customer / EPC
Project-specific mechanical design	Included	Provides input / approves
Mechanical system supply	Included	Receives / stores
Site installation and erection	Excluded	Primary responsible
HSE, equipment, labour and site records	Excluded	Primary responsible
Product warranty	Included	Claim and record responsibility
Installation / workmanship warranty	Excluded	Primary responsible

#### ANNEX-6 | Preparation Basis

- Existing ISOTEC specification drafts, warranty sample, installation manuals, technical reports and product catalogues provided by the user.
- Uploaded standards: TS EN 1090-1, TS EN 1090-2, TS EN 1090-3, TS EN 10346, TS EN ISO 1461, TS 13891, TSE K 473, TS EN 10051 and related reference standards.
- Publicly available corporate data: ISOTEC home page, ground-mount systems page and contact information.
- Technical reports and manufacturer technical publications regarding the comparison of ZM / Magnelis / PosMAC and HDG.

Note: This annex is not a binding technical-level table; it shows the basis on which the document was prepared. Binding provisions are contained in the main text and the signed annexes.