



Annex E FPC

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1. Abbreviations

The definitions in the Solar Keymark Scheme Rules apply.

2. General

This annex specifies the requirements for the Factory Production Control (hereafter FPC) and the quality management system covering the production line. The requirements mentioned in the following chapter are binding to all manufacturers and cannot be limited or excluded by provisions limiting his liability or exempting him from his liability for his products.

Inspectors will verify compliance with these requirements during their visits using the latest version of the inspection report templates (Annex A1 and Annex A2 of the SKSR). In case where requirements therein are not applicable for good reasons, it shall be explained in the report and be marked with "not applicable" (NA).

Annex E	ISO 9001:2015	FI Report
3 Organization	-	1,2,3,4
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3. Organization

The FPC shall be operated according to a documented quality system. The manufacturer shall establish, document and maintain the FPC system to ensure that the products placed on the market comply with the declared performance of the characteristics.

All quality documentation shall be kept up to date.

All necessary facilities, equipment and personnel shall be available to manufacture the product as it is certified.

The manufacturer may employ, under contract, subcontractors who have the facilities, equipment and personnel to carry out the inspection and tests on behalf of the manufacturer. The manufacturer shall be responsible for the results of control, calibration, and maintenance of testing and measuring equipment, whether owned by or on loan to the manufacturer or a subcontractor.

Inspection and testing shall be performed by personnel qualified for such tasks on the basis of documented appropriate education, training and/or experience.

4. Production process

4.1 Incoming goods inspection of raw materials and components

The manufacturer shall ensure that raw materials and other constituent materials conform to his specified requirements, thus avoiding that components are used for production that possibly could lead to non-conforming final products. The basis are manufacturer specifications and technical drawings defining the relevant properties of the materials and components for the specific product. Appropriate measures shall be established to ensure the conformity of the supplied raw materials with the specifications and technical drawings. Such measures may range from binding quality assurance agreement to full incoming goods controls.

Specifications, technical drawings and all verification measures shall be documented and traceable records shall be kept.

Recommended items for checks on purchased products to be carried out by the manufacturer are listed in clause 6.1 for collectors and clause 6.3 for storages. All performed checks and tests shall be recorded in writing with traceable responsibility according to the manufacturer's procedure.

4.2 Production control and testing during manufacture

To manufacture conforming products, the manufacturer shall control the production process and perform appropriate inspections and tests during production until the product is considered as finished product ready for delivery.

The procedures shall be documented and traceable records of the tests shall be available.

Examples for production controls are shown in clause 6.4 for collectors and clause 6.5 for storages.

The final product shall be checked and released by an assigned person. This release shall be documented.

4.3 Test equipment

Tests to demonstrate conformity of the product – including incoming goods - shall be performed using appropriate testing equipment and documented working instructions for its use. The test equipment shall be regularly calibrated and verified, as appropriate for the product.

Test equipment shall be identifiable and shall not be used for production purposes.

Traceable records shall be available.

4.4 Production equipment

The production equipment shall be regularly checked and verified for its aptitude to produce conforming product. Production equipment shall be identifiable.

Traceable records about verification checks of the equipment shall be available.

4.5 Handling, storage, packaging, transport and marking of finished products

Procedures for handling, storage, packaging, transport and marking of finished products shall be established that prevent from damage or deterioration of the final product.

5. Horizontal requirements

5.1 Documentation and records

All documents and records related with this FPC shall be identifiable and shall be managed such as to provide full traceability. This includes definitions of the rights to issue or modify these documents and records, as well as instructions for their archiving. The documents and records shall be kept for at least 3 years, it is however highly recommended to extend this duration to fulfil the requirements of the Council directive 85/374/EEC Article 10 and 11, which is 10 + 3 years after the last sample has been brought to market.

Documents and records can be kept as electronically only.

5.2 Non-conforming components and products

Along the whole production chain, all non-conforming components or products shall be identified, marked, segregated or controlled accordingly to prevent their further use. The manufacturer shall immediately take the steps necessary to rectify the deficiency.

Traceable records about non-conforming components and products shall be available.

5.3 Traceability of products

Products shall be identifiable and traceable with regard to their production origin and their main components (components that have a relevant impact on performance and durability). The serial number shall allow tracing back the origin of the main components of the product (batch number, delivery, etc.). It should be possible to list all the final products with their serial number manufactured using the main components of a certain batch or delivery.

5.4 Complaints

Procedures to handle complaints shall be established and records traceable records about shall be available. Complaints include customer complaints about the purchased product as well as complaints of the manufacturer incoming goods, raw materials and other constituent materials and services.

5.5 Information obligation

A procedure shall be established for informing the certification body about any changes of the certified product. Traceable records shall be available about all changes on the certified products.

5.6 Risk assessment

The manufacturer shall assess on a regular basis the main risks for his own products and his production and identify measures to reduce these risks. Possible risks are related with

- Lack of suppliers who can fulfil specifications for raw materials.
- Staff in production
- Production facilities, production equipment
- Product damaged after production, transport, installation
- Pandemic
- etc.

Traceable records shall be available.

6. Tables for recommended control on purchased products and on the final product and during production

6.1 General remark

The below listed products, components and materials are reflecting typical collector or storage designs. For differing or innovative designs, there might be the need for additional material and component control, checks or measures.

For those items marked with an (*) in the following tables, the frequency of checks may be decreased in result of the reliability of the supplier (ISO 9001 certificate etc.) and the history of deliveries (no complaints, no non-conformities). In this case a written procedure should exist, describing the rules for decreasing the frequency and return to full-check in case of non-conformities.

6.2 Checks on purchased products for collectors

Material	Method	Requirement	Frequency
Pipe	Visual check and documentation check	No damage	Each delivery (*)
	Measurement	Purchase specification: pipe dimensions within tolerance	
Absorber sheet	Visual inspection	No damage	Each delivery (*)
	Document check	Purchase specification: Parameters of optical characteristics (solar absorbance and thermal emittance)	
Absorber	Visual inspection	No damage	Each delivery (*)
	Document check	Purchase specification: Parameters of optical characteristics (solar absorbance and thermal emittance) and proper connection between absorber sheet and pipes (this may be a mechanical test also)	
Pipe grid	Visual inspection	No damage	Each delivery
	Document check	Purchase specification	
Reflector material, reflector shape (if the finished reflector is delivered)	Document check or direct test for shape (e.g.: master shape)	Purchase specification: Solar reflectance, shape	Each delivery (document check) or less frequency if it is tested
Heat pipes	Test for check performance (may be done by heat pipe manufacturer)	Purchase specification	Variable

Heat transfer sheet	Measurement	Purchase specification	Variable
Glass tubes (assembly of absorber and glass cover)	Specific test method	Purchase specification	Variable
Glazing	Measurement	Purchase specification: dimensions and optical characteristics (solar transmittance)	Each delivery (*)
	Document check or direct test	If only a document check is done, then there must be a special agreement to assure optical characteristics	
Insulation	Visual	No damage	Each delivery
	Document check	Purchase specification: density and thermal conductivity	Each delivery
	Weight measurement	Manufacturer's method	Each delivery (*)
	Dimension measurement		
	Outgassing test (only for flat plate collectors)		
Casing	Visual check	Purchase specification	Each delivery (*)
Material of frame elements	Visual check	Purchase specification	Each delivery (*)
	Measurement (verify product is inside tolerance)		
Material of rear panel	Visual check	Purchase specification	Each delivery (*)
	Measurement (verify product is inside tolerance)		
Hydraulic connections	Visual Check Measurement (verify product is inside tolerance)	Purchase specification	Each delivery (*)
Sealant	Documentation and Visual check	Purchase specification	Each delivery (*)

6.3 Checks on incoming goods for storage tanks

Components		Method	Requirements	Frequency	Comments
Storage tank	All types	General appearance Dimensional	In accordance with specifications	On each unit for the manufacturer On each batch delivery in case of subcontracting	The subcontractor shall provide a record of the checks performed on the tanks
		Tightness		Using water: 1.3 x stated service pressure. Using air: Pressure according to manufacturer specification.	
	Stainless steel type	Anticorrosion treatment of welds	In accordance with specifications	On each unit	
	Internal protective coating by enamelled type	Monitoring of oven temperature		Continuous	
		Destructive control to check enamel quality		Regular	
		Monitoring of oven time		Continuous	
		Coating thickness		By sampling	
		General appearance		On each unit	
	Other protective coating	Coating thickness		On each unit	
		General appearance			
Manufactured insulation	General appearance	In accordance with specifications	On each batch delivery by sampling		
	Dimensional				
	Density or thermal conductivity				
Storage tank (Subcontracted intermediate product)	General appearance	In accordance with specifications	On each batch delivery	The subcontractor shall provide a record of the checks performed on the cylinders	
	Dimensional				
	Leak tightness	Using water: 1.3 x stated service pressure. Using air: Pressure according to manufacturer specification.	On each unit		

6.4 Inspection and tests on collectors

Process	Method	Requirement	Frequency
Cutting of pipe	Measurement	Manufacturer specification for dimensions	At the beginning of each production order (*)
Cutting of absorber sheet	Measurement	Manufacturer specification for dimensions	At the beginning of Each production order (*)
Cutting of frames	Measurement	Manufacturer specification for dimensions	At the beginning of Each production order (*)
Connection of pipe to absorber	Visual	Proper welding	Each absorber
	Mechanical test with manufacturer's method		Manufacturer's specification
Absorber	Visual check	No damage	Each absorber
Reflector material	Visual	No damage	Each collector
Assembly	Visual	Proper assembly	Each collector
Sealing	Visual	Proper sealing	Each collector
Leakage	Manufacturer method for pressure test	Manufacturer method	Each collector
Release of each collector	Visual or manufacturer's method	Manufacturer method	Each collector

6.5 Inspections and tests on storage tanks

Components		Method	Requirement	Frequency	Comments
Storage tank	All types	General appearance Dimensional	In accordance with specifications	On each unit for the manufacturer. On each batch delivery in case of subcontracting	The subcontractor shall provide a record of the checks performed on the tanks
		Tightness	Using water: 1.3 x stated service pressure. Using air: Pressure according to manufacturer specification.	On each unit	
	Stainless steel type	Anticorrosion treatment of welds	In accordance with specifications	On each unit	
	Internal protective coating by enamelled type	Monitoring of oven temperature		Continuous	
		Destructive control to check enamel quality		Weekly	
		Monitoring of oven time		Continuous	
		Coating thickness		By sampling	
		General appearance		On each unit	
	Other type of protective coating	Coating thickness	In accordance with specifications	On each unit	
		General appearance			
Manufactured insulation	General appearance	In accordance with specifications	On each unit		
	Dimensional				
	Density/thermal conductivity				
Insulation produced by injection	Injection time	In accordance with specifications	By periodic sampling, after prolonged stoppage and change of injection products	The storage conditions of raw materials shall comply with the supplier's instructions.	
	Temperature/Hygrometry				
	General appearance				
	Dimensional				
	Density				