Introduction of DLR QUARZ® Scope Assessment Label for Independent Product Tests of CSP Key Components

C. Happich, J. Pernpeintner, B. Schiricke, E. Lüpfert, F. Sutter, A. Fernández García

Introduction

Knowledge about the performance and durability of CSP components is crucial for purchase decisions in solar power plant projects. Various laboratories, like the DLR QUARZ® Center, offer independent measurements. Due to the current lack of international standards the variety of test reports complicates the assessment of components for CSP projects. The label aims to alleviate this situation with a standardized classification of the underlying conditions of QUARZ® and OPAC test reports.

Methodology

Goal of the label is to support the end customer of CSP components in assessing the product quality based on the test report. This is achieved by classifying the test reports regarding two dimensions: The *scope level* characterizes the completeness of the testing scope. It provides a comparison of performed vs. possible tests. The *significance category* characterizes the amount of tested samples and the sampling conditions. The final evaluation of the test results remains task of the end customers as only they can take into account the individual service conditions and economic conditions. E.g. a receiver with average performance might be a good choice at low price. The label provides transparency about the quality of the basis of valuation for the QUARZ® test report.

Although in the detailed test report specific test results may be classified or even be subject to pass-fail criteria, the aim of the label is not to state a pass/fail judgment result regarding the quality of the tested product but to classify the quality and relevance of the test itself.

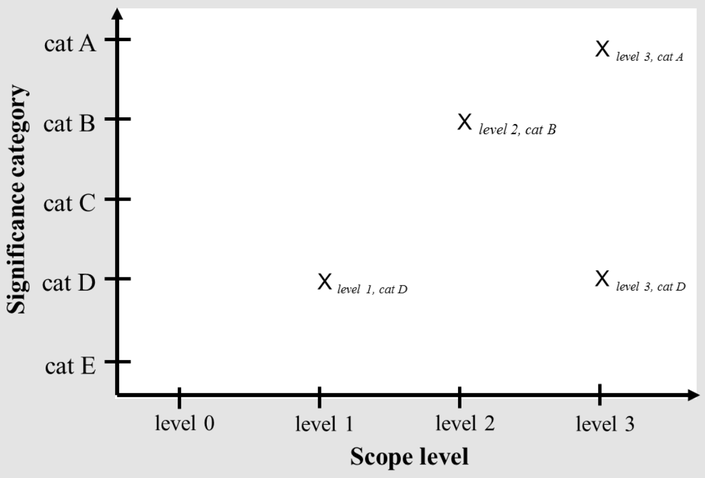

Fig. 1: Scope assessment with the two dimensions *significance category* and *scope level* with four exemplary assessed scopes

Table 1. *Scope levels* for parabolic trough receivers 2017

Parabolic Trough Receivers	Level 1	Level 2	Level 3
Required Tests with Receivers:	Heat Loss Optical Efficiency	Heat Loss I Optical Efficiency Overheating Heat Loss II Optical Efficiency II	Heat Loss I Optical Efficiency Thermal Cycling Overheating Heat Loss II Optical Efficiency II Bellow Fatigue
Required Tests with Glass Envelope Samples:	-	-	Transmittance I Condensation Taber Abrasor Transmittance II

Table 2. *Scope levels* for parabolic trough reflectors 2017

Parabolic Trough Reflectors	Level 1	Level 2	Level 3
Required Tests with Facets:	Shape Accuracy Pad Accuracy Reflectance Pad Adhesion	Shape Accuracy Pad Accuracy Reflectance I Pad Adhesion	Shape Accuracy Pad Accuracy Reflectance I Damp Heat Neutral Salt Spray Pad Adhesion
Required Tests with Small Reflector Samples:	-	Reflectance I Basic Ageing* Reflectance II Degradation Analysis	Reflectance I Advanced Ageing* Reflectance II Degradation analysis

*Accelerated ageing testing dependent on reflector type (glass/aluminum) and method (only aluminum)

Quality criteria

Scope level and *significance category* are independent of each other and are hence two dimensions of the classification, compare Fig 1. Both are organized hierarchically, i.e. a certain level or category can only be achieved if all criteria for the previous level or category are met. The label is marked with the year date as levels and categories for each component are adapted to represent current technical possibilities.

Scope level and *significance category* are first defined in general form from which classifications for specific components are derived. The general classifications are:
Scope levels compare the performed tests to the type and completeness to the available tests:

- Level 3: advanced ageing
- Level 2: simple ageing
- Level 1: full characterization of initial performance
- Level 0: scope that does not meet requirements of level 1

Significance categories describe, how representative the test is regarding the final product quality

- Cat A: independent sampling from serial production
- Cat B: report published
- Cat C: independent sampling from larger quantity according to Solar Keymark or better
- Cat D: recommended quantity of samples achieved
- Cat E: recommended quantity of samples not achieved

For illustration, scope levels for parabolic trough receivers and reflectors are shown in Table 1 and Table 2 in their version for 2017.

Summary

The label supports the end customer of CSP components in assessing the product quality based on the detailed test report. It provides a classification of the quality and relevance of the underlying tests which have been performed in the test assignment regarding

a) their significance in terms of sampling conditions
b) and the completeness of the characterization.

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Contact: **Institute of Solar Research** | Qualification | Cologne | Christoph Happich
Telephone: +49 2203 601- 3983 | E-Mail: christoph.happich@dlr.de

DLR Deutsches Zentrum für Luft- und Raumfahrt
German Aerospace Center