

Overview of Progress on the IEC Tracker Design Qualification Standard



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Outline

- Brief history of work towards a tracker standard
- Tracker technical specification
- Scope of the tracker design qualification standard
- Key testing in the current draft
- Debates/Challenges
- Current status and plans for the next 12 months

Brief History

- Shortly after IEC TC82 WG7 (working group 7 --- Concentrator Photovoltaics) formed, decision to also commence work on a standard for trackers
 - March of 2007, Tracker subgroup formed
First develop a technical specification , follow with full tracker design qualification standard.
 - March 2008, Working draft in place for the technical specification (TS)
 - September 2010, the TS was approved by WG7 for submittal to IEC
 - September 2010, vote to begin drafting a Tracker Design Qualification Standard (TDQS)
 - April 2011, decision to include the TS text in the new TDQS, when TS expires information will be held in one document
 - Sept 2011, WG7 agrees on TDQS scope/purpose and to submit a new work item proposal (NWIP)
 - The tracker subgroup has prepared a TDQS working draft to submit with NWIP
 - Tracker technical specification assigned TS 62727, IEC is in publication process

Tracker Technical Spec (TS 62727)

- The TS provides:
 - A consistent set of definitions and terminology for discussing and comparing trackers
 - A suggested specification sheet for manufacturers of trackers
 - A procedure to follow for measuring tracking accuracy
 - A statistical means of reporting tracking accuracy

Tracker Technical Spec (TS 62727)

Characteristic	Example	Notes/Clause/Subclause
Manufacturer	The XYZ Company	
Model number	XX1090	
Type of tracker	CPV Tracker, Dual Axis	4.2,4.3
Payload characteristics		
Minimum/maximum mass Supported	100/1 025 kg	4.8.3
Payload center of mass Restrictions	0-30 cm distance perpendicular to mounting surface	4.8.3
Maximum dynamic torques allowed while moving	Azimuth (Θ_z): 10 kN-m Θ_x, Θ_y : 5 kN-m [should provide a set of diagrams to clarify torques and which axes they are relative to]	4.13.2,7.3
Maximum static torques allowed while in stow position	[should provide a set of diagrams]	4.13.1,7.3
Installation characteristics		
Allowable foundation	Reinforced concrete	4.6.2
Foundation tolerance in primary axis	$\pm 0,5$ degrees	4.9
Foundation tolerance in secondary axis	$\pm 0,5$ degrees	4.9
Electrical characteristics		
Includes backup power?	No	N/A
Daily energy consumption	1 kWh typical 5 kWh maximum	4.7.1
Stow energy consumption	kWh typical 1 kWh maximum	4.7.2
Input power requirements	100-240 VAC, 50-60 Hz, 5A	No specifics defined
Tracking accuracy		
Accuracy, typical (low wind, min deflect point)	0,1 degrees	5.4.6
Accuracy, typical (low wind, max deflect point)	0,3 degrees	5.4.6

Tracker Design Qualification Standard

Scope

This design qualification standard is applicable to ***solar trackers for photovoltaic systems*** but may be used for other solar applications. The standard defines ***test*** procedures for both ***key components*** and for the ***complete tracker system***. In some cases, test procedures describe methods to measure and/or calculate parameters to be reported in the defined tracker specification sheet. In other cases the test procedure results in a pass fail criteria.

Purpose and justification

This document ensures to the user of the said tracker that ***parameters reported*** in the specification sheet were ***measured by consistent and accepted industry procedures***. This provides the customer with a sound basis for comparing and selecting a tracker appropriate to their specific needs.

Pass/fail testing criteria have the purpose:

- ***Separating*** tracker designs that are likely to have ***early failures***
- Mechanical and environmental testing gauges the tracker's ability to ***perform under varying operating conditions as well as to survive extreme conditions***.
- Mechanical testing is ***NOT*** intended to certify structural and foundational designs as this type of certification is specific to local jurisdictions, soil types, and other local requirements.

Overview of TDQS testing

- Tracking accuracy
- Functional validation tests (verify basic functions, stow, tracking limits, etc)
- Basic performance metrics such as energy usage, time to stow, etc
- Mechanical testing
 - drive train pointing repeatability
 - deflection under static load
 - torsional stiffness, drive torque, backlash
 - moment testing under extreme wind loads
- Accelerated environmental testing
 - 250 temperature cycles from -30 °C to 45 °C
 - 10 humidity freeze cycles
 - Freeze/Spray
- Accelerated mechanical testing
 - 3650 cycles (~10 years following sun)
- Salt spray test
- Qualification testing for specific to tracker electronic equipment
 - very similar to IEC 62093 (PV balance of system components)

Debates/Challenges

- The draft of the TDQS is primarily finished but there are still key debates to settle
 - Temperature extremes for environmental testing?
 - To load or not to load during mechanical cycling?
- Should vibration and dust test be included, (Large size could be too costly)
- Do all the tests have a high benefit/cost ratio?
 - There is a lack test data on trackers
 - In lieu of data, industry experts have been involved in the draft writing

Status and plans for the next 12 months

- The NWIP and current draft are being submitted to IEC
- Spring/Fall WG7 meetings, find consensus on key tests
- Respond to comments that come forth from IEC voting members
- If all goes well the document can move to publication stage in 2013

Summary

- Tracker technical spec 62727 is being published.
 - Start using it, if there are problems provide feedback so these issues can be corrected in the TDQS
- An overview has been provided of the TDQS.
 - If you or someone in your company has experience with this type of testing and would like to review the document please contact matthew.muller@nrel.gov . Its not too late to make positive improvements.
 - Requirements: YOUR TIME

THANKS!