



HANWHA Q.CELLS QUALITY

BUILT TO WEATHER ANY STORM

Cyclone Testing Station results

We always go to the extreme at Hanwha Q.CELLS to prove the safety and reliability of our modules. Therefore, we commissioned the renowned Cyclone Testing Station at James Cook University based in Queensland, Australia to put our modules to the test. We wanted to find out whether our modules could withstand the most severe cyclones to ever hit Australia in order to ensure that they are suitable for all wind regions across the country.

THE PRESSURE TEST

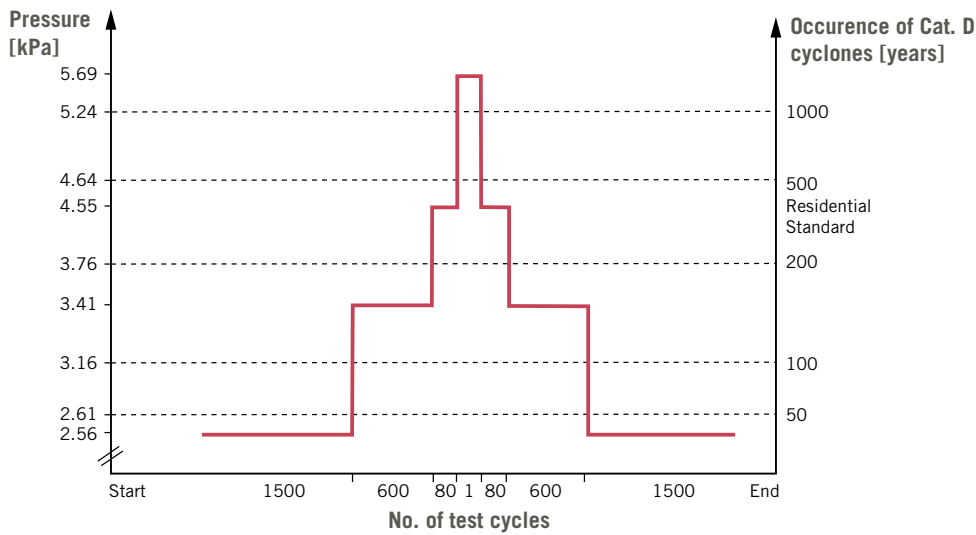
- Performed at Cyclone Testing Station at James Cook University, QLD.
- Tested modules: Q.PRO-G2 and Q.PEAK.
- Static and dynamic testing with conventional roof-mounted structure for wind region C – the most severe category for all major Australian cities.
- Static and dynamic testing with ground-mount structure for wind region D, the highest category in Australia.

THE RESULTS

Hanwha Q.CELLS solar modules:

- are the first modules with a conventional roof top mounting structure to pass pressure testing equivalent to wind region C. They are tough enough to withstand pressure that corresponds to cyclones that occur once every 2,000 years. Plus, they survived more pressure than the conventional mounting structure.
- are even strong enough to pass wind region D testing for pressure that is equivalent to wind gusts of 306 km/h with a ground mount structure. They were unbreakable even after over 10,000 cycles and pressure up to 5.69 kPa for wind region D.
- are strong enough to have survived cyclones Larry and Yasi.

TEST DESIGN FOR CATEGORY D CYCLONE TEST



The test design consists of repeated test cycles of wind pressure.

For example, after a pressure of 3.41 kPa is applied for 600 test cycles, 4.55 kPa are applied for 80 test cycles, followed by one test cycle of 5.69 kPa. After that the test cycles are repeated in reverse.

CYCLONE HISTORY

CYCLONE	LOCATION AND DATE	CATEGORY* AND WIND SPEED	DESTRUCTIVE FORCE
Cyclone Larry Australia	Innisfail, QLD March 20, 2006	Cyclone category 4 in wind region C, gusts of 240 km/h	No lives lost but 10,000 homes damaged.
Cyclone Yasi Australia	Mission Beach, QLD February 3, 2011	Cyclone category 5 in wind region C, gusts of 285 km/h	The most damaging cyclone to ever hit Queensland with destruction worth over \$3.6b.
Hurricane Katrina USA	North Miami Beach, FL August 29, 2005	Cyclone category 3-4 in most severe hurricane region of the United States, gusts of 204 km/h	One of the five deadliest hurricanes to ever hit the United States with \$125 b worth of damage, mostly due to flooding.
Hurricane Kyrill Europe	Central and West Europe January 18, 2007	Cyclone category 3, gusts of 225 km/h	One of the deadliest hurricanes to ever hit Europe with \$5.8 b worth of damage.

* Australian Cyclone Severity Scale

