

RESS-4-11



Comments

for

'Proposal of Fire resistance test'

July 5 ~7, 2011

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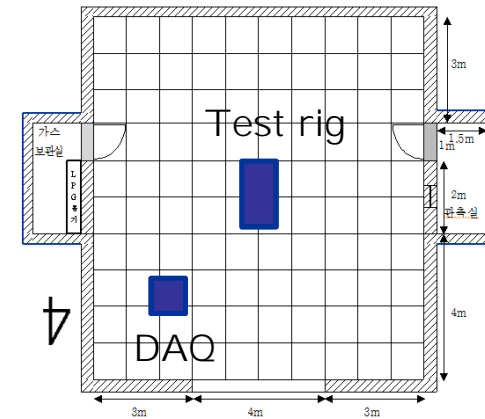
1. Test purpose

Test purpose

- To verify whether proposal of 'fire resistance test' has any problem
 - ✓ Measuring T – profile
 - ✓ Checking outdoor test possibility

2. Test configurations

Test configurations



Descriptions

- * Mock-up simulates real DUT size (L x W x H, 920 x 605 x 206 in mm)
- * DAQ get 8 temp. channel
 - Under the DUT (center & side)
 - Middle of DUT (external)
 - 200, 500, 800, 1100 mm above the DUT
- * Pan exceed the horizontal projection of the every DUT side by 25cm (Proposal : 20 ~ 50cm)

3. Test conditions & results

Test conditions 1/2



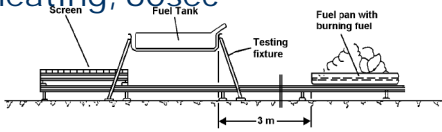
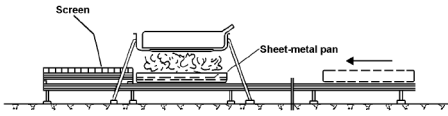

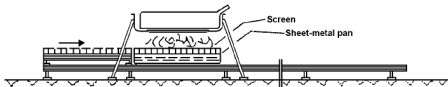
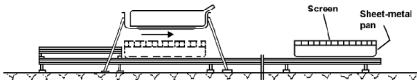
Measuring point



	Test environment	Proposal limitation
* Initial ambient temp.	32.2 °C	No limitation
* Wind velocity	about 0.5 m/sec	2.5 km/hr (= 0.69 m/sec) * Wind rarely felt
* Fuel quantity	25 lit./m ²	At least 25 lit./m ²

3. Test conditions & results

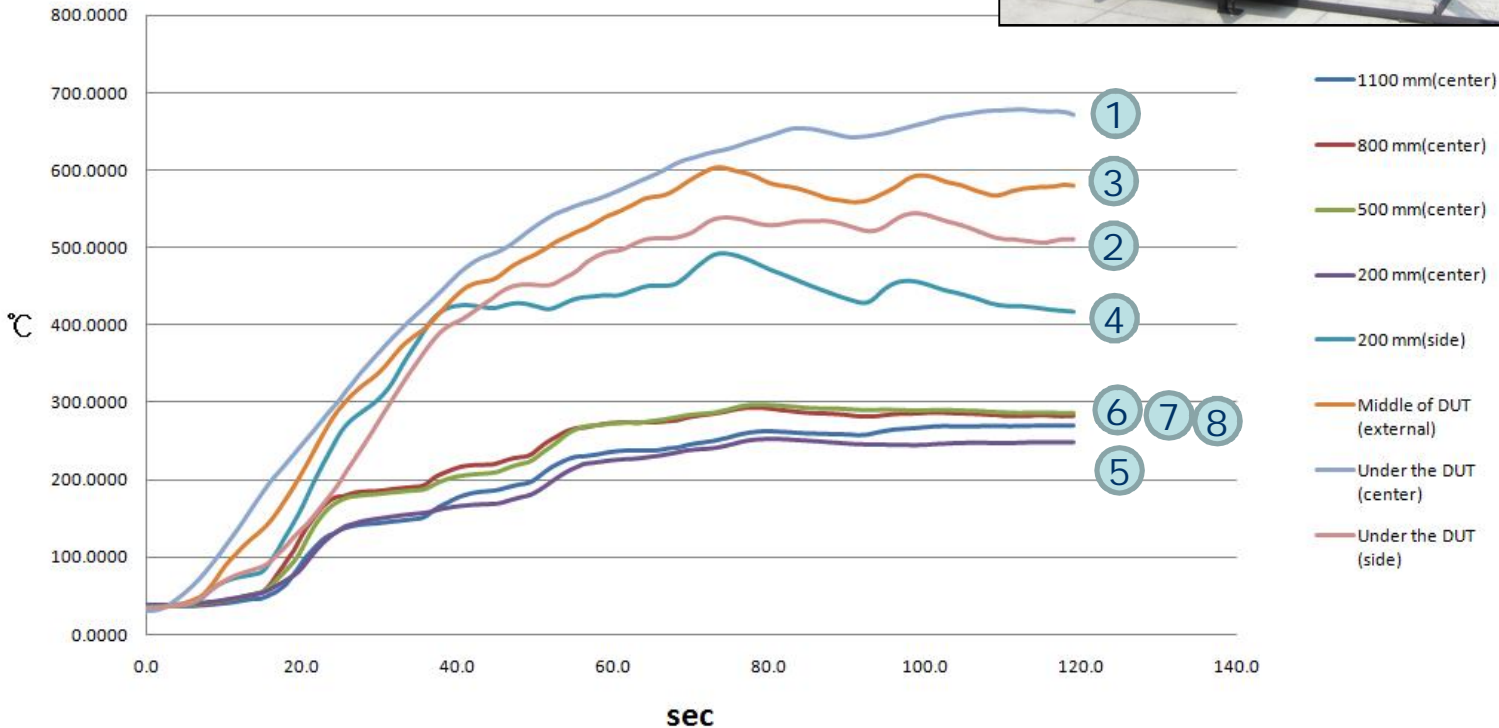
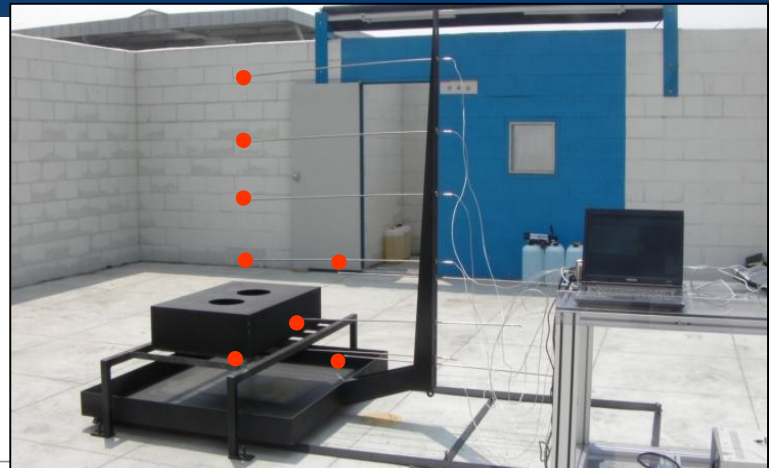
Test conditions 2/2

Proposal	KATRI test
<ul style="list-style-type: none">Phase A : Pre-heating, 60sec 	<ul style="list-style-type: none">* Only 'Direct exposure'* Temp. data were acquired for 120 sec
<ul style="list-style-type: none">Phase B : Direct exposure, 90 sec 	
<ul style="list-style-type: none">Phase C : Indirect exposure, 60 sec 	
<ul style="list-style-type: none">Phase D : End of test, 24hr 	

3. Test conditions & results

Test results 1/2

- ⑧
- ⑦
- ⑥
- ⑤
- ④
- ③
- ①
- ②



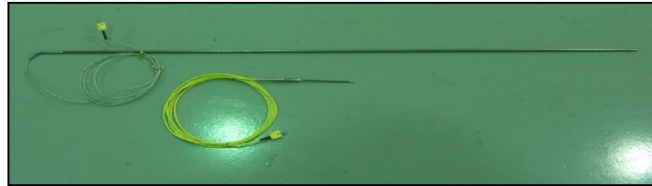
3. Test conditions & results

Test results 2/2

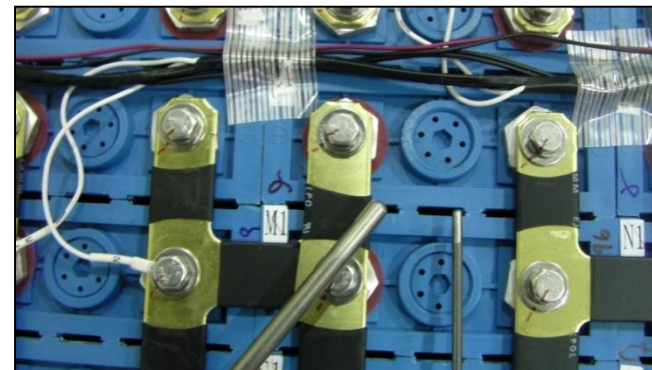
- Despite of the weak wind, temperature curve cannot be easily stabilized
- Even if initial wind velocity is lower than proposal limitation, heat generated by flame causes turbulence
- Temperature at ① is the highest one

3. Test conditions & results

- K-type thermo couple (D : 6.4/3.2 mm)



• HEV type RESS



• NEV type RESS

4. Comments for 'Fire resistance test'

Comments 1/2

Proposal	Comments
1. Outdoor test is possible (Only wind velocity limitation, 0.69m/s)	1. Outdoor test is hard to do → Even if initial wind velocity is lower than proposal limitation, heat generated by flame causes turbulence → Consider walls surrounding DUT → Indoor test facility is too expensive (including explosion-proof system)
2. Fuel quantity : at least 25 lit./m ²	2. Fuel quantity : at least 15 lit./m ² → 25 lit./m ² lasts more than 5 min.
3. 4 phase of test condition : Pre-heating -> Direct exposure -> In-direct exposure -> End	3. Only direct exposure, 120 sec → Direct exposure could represent almost of fire circumstance → Also EUCAR use '2 min' of heat (890 ~ 900 °C) <i>('Specification of test procedures for safety testing of battery packs' by EUCAR)</i>

4. Comments for 'Fire resistance test'

Comments 2/2

Proposal	Comments
4. 'No extinguishing to RESS' & 'monitoring whole Phase 4(24hr, End of test)	4. To be deleted for 'No extinguishing' & 'monitoring whole Phase 4' → Due to the rationale of this 'Fire resistance test', what will happen without exposure is not important → Due to the sensor shielding, temperature monitoring for inside of RESS-pack is impossible
5. Acceptance criteria : During phase A to D, No explosion	5. Acceptance criteria : During phase A to C (except 'End of test') of the test, No explosion → Same reason with 4 th comment

• Rationale of proposal :

Simulates exposure of [RESS] to fire from the outside of the vehicle due to e.g. a fuel spill from a vehicle (either the vehicle itself or a nearby vehicle). This situation should leave the driver and passengers with enough time to evacuate and no explosion should occur in a later stage.



Thank you!

