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Teste interlaboratoare de inflamabilitate pe suprafețe calde pentru ISO 20823

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Manifold Ignition test inter-lab study for ISO 20823

The complexity of fire tests is suggested in Fig. 1, by the number of involved factors.

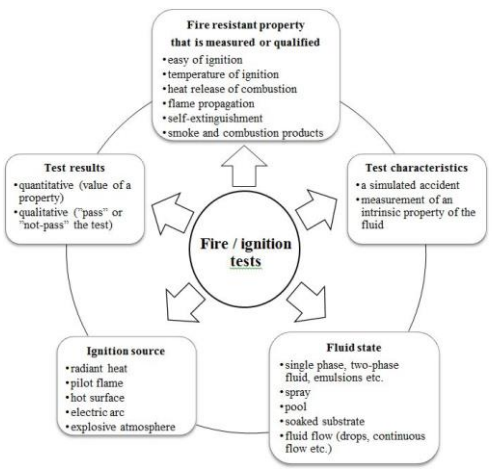
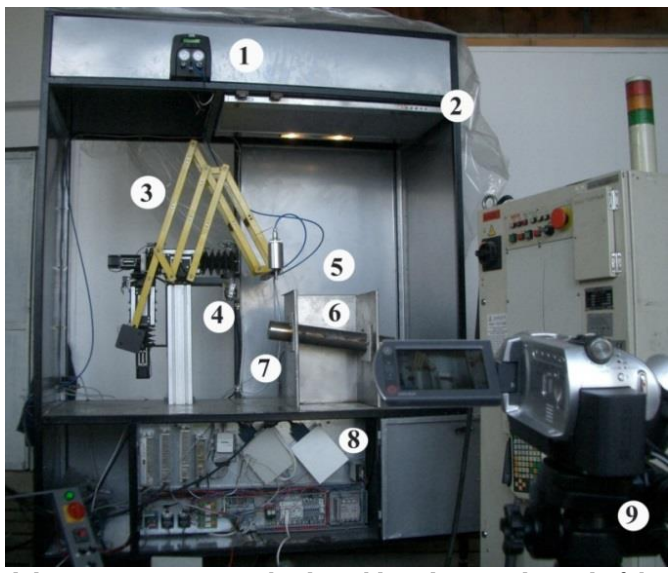


Fig. 1. Factors influencing the fire tests



1 – a digital dispensing system, with adjustable volume and speed of the drip, 2 – a ventilated enclosure with protection against explosion, thermal insulating glass, exhaust outside the building of gas released by burning, 3 – a robotic system for displacing the dispenser, 4 – a fluid reservoir, 5 – an enclosure for high temperatures and manifold, made of refractory stainless steel, 6 – a heating thermostat (till 700ºC ± 5ºC), 7 – a temperature monitoring system with a thermocouple attached to the heated tube and protected by the same material, in a welded case on the manifold, 8 – an automation system (including a dedicated software for controlling the equipment), 9 – a video camera

Fig. 2. The test equipment [1]

ISO 20823 Inter-laboratory Study

Results Sheet

Participating Laboratory LubriTest "Dunarea de Jos" University, Galati, Romania;
Date 11.06.2018, 12.06.2018 and 13.06.2018 ;
Fluid Designation A1; Operators' Initials DL and SCL:
Date , 5.11.2018, 30.10.2018, 31.10.2018
Fluid Designation A2; Operators' Initials DL, SCL and OGG:
Date of last calibration of thermocouple: January 2008.

Test Temperature (°C)	Ignition (Yes or No)	Behaviour of Fluid as it Falls from Tube	Unusual Observations/Any Deviation from Standard Procedure
Test 1			
338	No	it does not burn	
440	No	it does not burn	
442	No	it does not burn	
444	No	it does not burn	
448	No	it does not burn	
452	Yes	It burns.	During the test, the manifold temperature increases at 458°C
Test 1 Result: Lowest Ignition Temperature (°C) 452 Highest Temperature with NO Ignition (°C) 448			
Test 2			
448	No	it does not burn	
452	No	it does not burn	White smoke
454	No	it does not burn	Exhaling white smoke
456	No	it does not burn	White smoke
460	No	it does not burn	Smoke is exhaled on the jet falling in the tray
464	No	it does not burn	
470	No	it does not burn	Exhaling white smoke
480	Yes	it ignits violently.	It burns in the tray
476	Yes	it ignits.	It burns in the tray
473	Yes	it ignits after 10 s.	It burns in the tray
470	Yes	it ignits.	It burns in the tray
464	Yes	it ignits.	It burns in the tray
460	No	It does not burn	Exhaling white smoke
460	No	It does not burn	Exhaling white smoke
Test 2 Result: Lowest Ignition Temperature (°C): 464 Highest Temperature with NO Ignition (°C): 460			

Fig. 3. Results sheet for fluid A, samples 1 and 2

Dear Prof Deleanu,

Re: ISO 20823 – Manifold Ignition Test
– Invitation to Participate in the Generation of Precision Data

The ISO 20823 test method is used in the assessment of the flammability – or fire resistance – of industrial fluids and lubricants, and is currently specified in ISO hydraulic fluid standards 10050 and 12922. Unfortunately at present it has no precision statement.

Although an NWIP ballot recently voted to confirm the above method it became obvious some time ago to a number of the current users that the current text is lacking in detail, and as a result, fails to provide the most accurate data possible. Consequently the text has been revised with a greater focus on controlling the delivery of the fluid onto the manifold; the measurement of temperature at the point of contact and allowing the use of both a continuously variable transformer as well as the 'stepped' or fixed range type. A CD ballot has already been held and various comments made from the national committees. As a consequence of these and other comments from users, some further slight modifications to the text have been made. The new text will be submitted for a DIS ballot and therefore further modifications cannot be entirely excluded. However, no significant changes are expected and, assuming there are sufficient participating laboratories, it is the intention to arrange for an evaluation of the method's precision. It is anticipated that any precision statement arising from the inter-laboratory study would be added following the approval of the text.

It is understood that your organisation has the necessary basic equipment to carry out this method, although it is not certain if it conforms to the latest requirements. A copy of the draft DIS method is therefore attached for your study and comment.

...

David Phillips

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Fig. 4. A fragment from the invitation letter for participating at these interlab tests

This study was initiated by prof. W David Phillips, fom W David Phillips & Associates, Hydraulic Fluid and Lubricant Consultant, 7 Kettleshulme Way, Poynton, Stockport, Cheshire SK12 1TB (frfluids@onetel.com)
This second edition supersedes the first edition, ISO 20823:2003. Since its introduction, experience with this document has indicated that there is insufficient detail – particularly with respect to the delivery of the fluid to the tube and the measurement of the tube temperature at the point of contact and that, as a result, precision was poor.
There were 11 fluid grades to be tested, an example being given in Fig. 5.

Fig. 5. Images extracted from recorded tests done with fluid E, second sample.

The authors considers that a precision of temperature indicator capable of reading of ±1 °C is non-practical for high temperatures (700 °C or more) and recommend ±3 °C, based on their experience in the field.
These test s are useful in ranking fluids used in risky environments as mines, chemical reactors, gas and oil manufacturing equipment, but also aircrafts and ships.

References

[1] Georgescu C., Cristea G. C., Solea C. L., L. Deleanu, Flammability of Vegetal Oils on Hot Surface, Revista de chimie, 2018 69(3) pp 668-673
[2] Deleanu L., Georgescu C., Ciortan S., Solea L.C., Flammability of emulsions on hot surfaces, Industrial Lubrication and Tribology 67(5), pp. 434-440, 2015
[3] Deleanu L., Ciortan S., Georgescu C., Flammability Tests on Hot Surface for Several Hydraulic Fluids, Tribology in industry, Vol. 33, No. 3, 2011.

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