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Space systems — Test procedure to evaluate spacecraft material ejecta upon hypervelocity impact

AMENDMENT 1: Oblique impacts and Annex C update

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This document was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 14, *Space systems and operations*.

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Space systems — Test procedure to evaluate spacecraft material ejecta upon hypervelocity impact

AMENDMENT 1: Oblique impacts and Annex C update

Annex C, second paragraph

Replace the last sentence with the following:

Recent experimental set-up and preliminary results are described by Y. Fujimura *et al.*[15] and by A. Francesconi *et al.*[21].

Annex C, b), first paragraph

Replace the last sentence with the following:

A possible set-up, such as the one used at the Kyushu Institute of Technology[9] is shown in Figures C.1 to C.4.

Annex C, b), second paragraph

Replace the last sentence with the following:

As evidenced by K. Sugahara[16], it is difficult and time-consuming to identify impact features smaller than 25 µm in diameter.

Annex C, c), second paragraph

Replace the text with the following:

The value given by Cour-Palais, C = 1,28 (see References [17] and [18]) can be chosen for use in this document. As an example, the D/d ratio for an ejecta velocity of 1 km/s is close to 1,3, whereas it is close to 3,9 for an ejecta velocity of 5 km/s.

Annex C, c), fourth paragraph

Replace the text with the following:

The size of the ejecta can also be derived from the size of perforations obtained on a thin witness foil. In this case, the size of the holes is the same as the size of the particles, when the foil is thin compared to the size of the ejecta (see Reference [19]).

Annex C, d), first paragraph

Replace the first sentence with the following:

Recovery of intact fragments is possible using, instead of metal witness plates, a low-density material such as silica aerogel (see Figure C.5), or a soft material such as foam or cardboard.

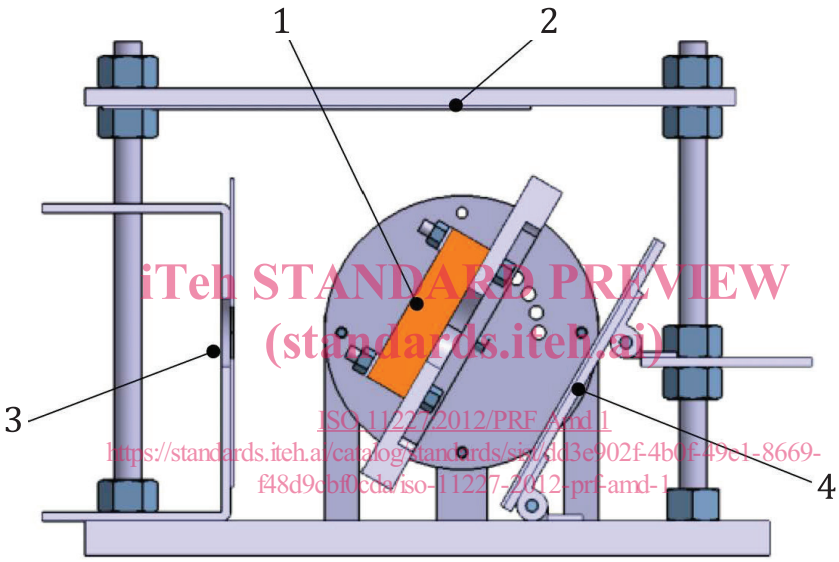
Annex C, e), first paragraph

Replace the first sentence with the following:

The velocity (and also the spatial distribution) of the ejecta can be measured with a high-speed video camera, as shown on Figure C.6.

Annex C

Add the following two figures after Figure C.2 and renumber the subsequent figures:



Key

1 target
2 witness plate (top)
3 witness plate (front)
4 witness plate (back)

NOTE The front witness plate can be removed when the front ejecta is negligible.

Figure C.3 — Sketch of target and witness plate assembly for oblique impact

NOTE The front witness plate can be removed when the front ejecta is negligible.

Figure C.4 — Picture of target and witness plate set-up for oblique impact

Bibliography

Add the following entry after Reference [14] and renumber subsequent entries:

[15] FUJIMURA Y., AKAHOSHI Y., KOURA T., FAURE P., NORIMATSU K. and SERBOUTI Y., Revision plan of ISO 11227 considering oblique impact tests, Procedia Engineering Vol.103, 2015, pp.129-134

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