



MIL STD 883 SHEAR TESTING

ADVANCED TECHNOLOGY FOR
RESEARCH & INDUSTRY

KNOWLEDGE BASE FACT
SHEET

- SCOPE: Explanation of the MIL STD 883 shear testing; describing the type of failure resulting from this application of force (if failure occurs); and the visual appearance of the residual die attach media and substrate/header metallization.

Shear Strength:

A force sufficient to shear the die from its mounting or equal to twice the minimum specified shear strength (figure 2019-4), whichever occurs first, shall be applied to the die.

Testing Methods:

See IKB018 UNDERSTANDING SHEAR TESTING for an explanation of how shear testing works, and the main points to take note of when shear testing.

Failure Criteria:

A device which fails any of the following criteria shall constitute a failure:

1. Fails die strength requirements (1.0X) of figure 2019-4.
2. Separation with less than 1.25 times the minimum strength (1.0X) specified in figure 2019-4 and evidence of less than 50 percent adhesion of the die attach medium.
3. Separation with less than 2.0 times the minimum strength (1.0X) specified in figure 2019-4 and evidence of less than 10 percent of adhesion of the die attach medium.

NOTE: For eutectic die attach, residual silicon attached in discrete areas of the die attach medium shall be considered as evidence of such adhesion. For metalised glass die attach, die attach material on the die and on the package base shall be considered as evidence of acceptable adhesion.

Separation Categories:

When specified, the force required to achieve separation and the category of the separation shall be recorded:

- a. Shearing of die with residual silicon remaining.
- b. Separation of die from die attach medium.
- c. Separation of die and die attach medium from package.

SUMMARY:

The following details shall be specified:

- a. Minimum die attach strength if other than shown on figure 2019-4.
- b. Number of devices to be tested and the acceptance criteria.
- c. Requirement for data recording, when applicable (see 3.2.1).

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IKB026, REV 1
PATH: Bond Testing - MIL 883 Die Shear Failure Modes

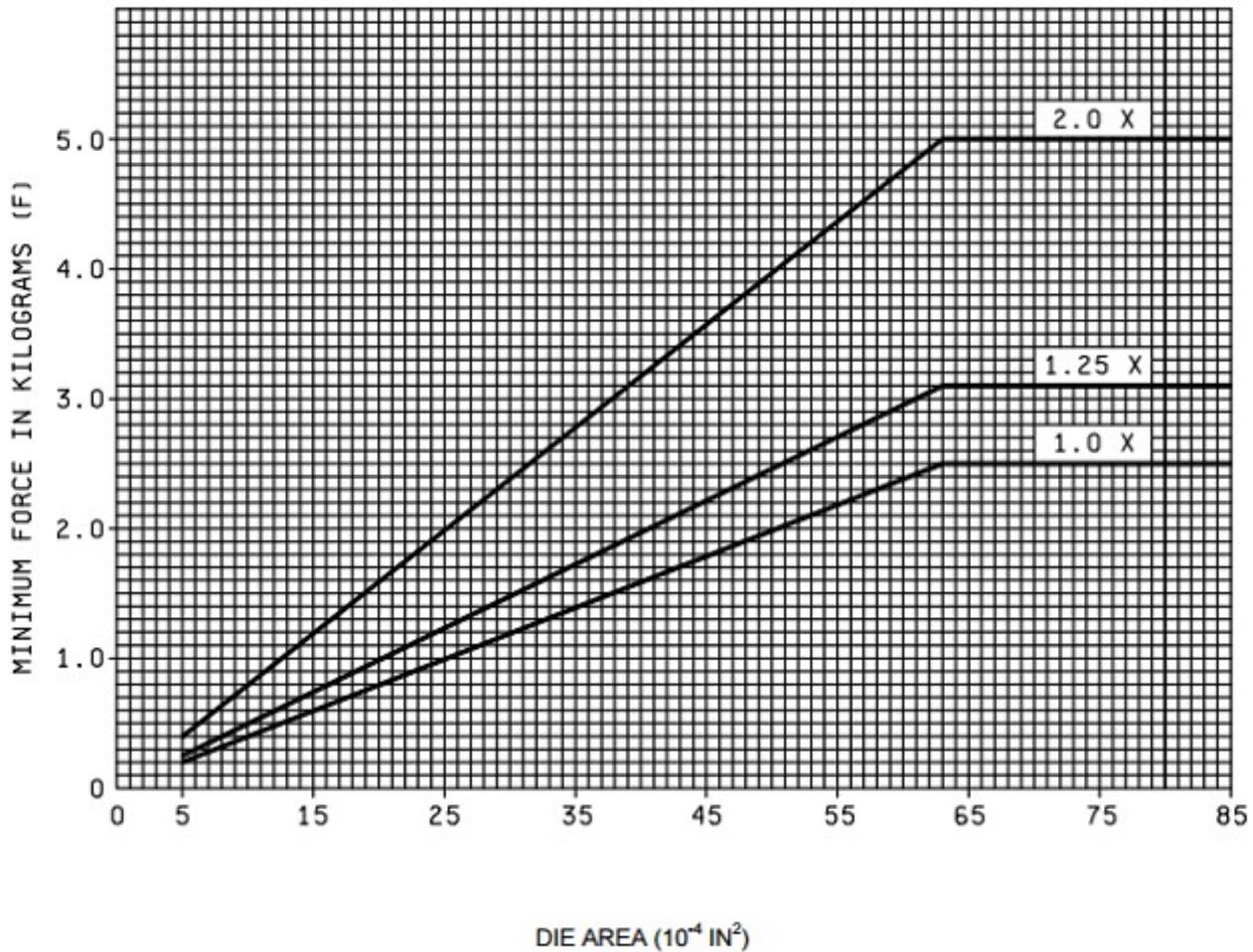


Figure 2019-4. Die Shear Strength Criteria (minimum force verses die attach area)

NOTES:

1. All die area larger than $64 \times 10^{-4} \text{ (IN)}^2$ shall withstand a minimum force of 2.5 kg or a multiple thereof (see Failure Criteria section above).
2. All die area smaller than $5 \times 10^{-4} \text{ (IN)}^2$ shall withstand a minimum force (1.0X) of $0.04 \text{ kg}/10^{-4} \text{ (IN)}^2$ or a minimum force (2X) of $0.08 \text{ kg}/10^{-4} \text{ (IN)}^2$. FIGURE 2019-4. Die shear strength criteria (minimum force versus die attach area).

Ref: MIL-STD-883E METHOD 2019.5 29 May 1987 1 METHOD 2019.5 DIE SHEAR STRENGTH