

[PRODUCTS DATA] **CONDITIONS UNDER WHICH FRACTURE, BREAKAGE, AND ABNORMAL WEAR ARE LIKELY TO OCCUR**

■ **Conditions under which fracture, breakage and abnormal wear are likely to occur**

| Factor             |                               | Condition   | Possibility of damage to tip |        |       | Possibility of large wear |        |       | Possibility of thin punch breakage |        |       |
|--------------------|-------------------------------|---|------------------------------|--------|-------|---------------------------|--------|-------|------------------------------------|--------|-------|
|                    |                               |   | Large                        | Medium | Small | Large                     | Medium | Small | Large                              | Medium | Small |
| Tool material      |                               | Heat-treatment hardness too high                  | ○                            |        |       |                           |        | ○     |                                    |        |       |
|                    |                               | Material not uniform (ex.: internal defect)       | ○                            |        |       |                           |        | ○     |                                    |        | ○     |
|                    |                               | Materially similar tool and workpiece materials   | ○                            |        |       |                           |        | ○     |                                    |        | ○     |
| Workpiece material |                               | Presence of oxide film on surface                 |                              |        | ○     |                           | ○      |       |                                    |        | ○     |
|                    |                               | High hardness                                     |                              | ○      |       |                           | ○      |       |                                    | ○      |       |
|                    |                               | Large elongation and high viscosity               | ○                            |        |       |                           | ○      |       |                                    | ○      |       |
| Working conditions | Tool contour                  | Too long relative to diameter                     |                              |        | ○     |                           | ○      |       |                                    | ○      |       |
|                    |                               | Small punch shoulder roundness                    |                              |        | ○     |                           |        | ○     |                                    | ○      |       |
|                    |                               | Sharp corners on punch tip                        |                              |        |       |                           | ○      |       |                                    |        | ○     |
|                    |                               | Rough surface finish                              | ○                            |        |       |                           |        | ○     |                                    |        | ○     |
|                    | Clearance                     | Extremely small                                   | ○                            |        |       |                           | ○      |       |                                    | ○      |       |
|                    |                               | Uneven  | ○                            |        |       |                           | ○      |       |                                    | ○      |       |
|                    | Lubrication                   | Not lubricated                                    | ○                            |        |       |                           | ○      |       |                                    | ○      |       |
|                    |                               | Incorrect lubricant                               |                              | ○      |       |                           |        | ○     |                                    |        | ○     |
|                    | Bridge width                  | Uneven  | ○                            |        |       |                           | ○      |       |                                    | ○      |       |
|                    | Punch guide                   | No punch guide                                    |                              | ○      |       |                           | ○      |       |                                    | ○      |       |
|                    |                               | Poor accuracy of punch guide                      |                              | ○      |       |                           |        | ○     |                                    | ○      |       |
|                    | Holding of workpiece          | No plateretainer<br>(when fixed stripper is used) |                              | ○      |       |                           |        | ○     |                                    |        | ○     |
|                    |                               | Insufficient plate holding force                  |                              | ○      |       |                           |        | ○     |                                    |        | ○     |
| Abnormal punching  | Double shot or two-sheet shot | ○   |                              |        |       | ○                         |        |       | ○                                  |        |       |
| Press, die set     |                               | Low press rigidity                                |                              | ○      |       |                           | ○      |       |                                    | ○      |       |
|                    |                               | Poor press accuracy                               |                              | ○      |       |                           | ○      |       |                                    | ○      |       |
|                    |                               | Poor die set accuracy                             |                              | ○      |       |                           |        | ○     |                                    | ○      |       |

(Press Working Data Book, 1980, The Nikkan Kogyo Shim bun Ltd.)