

Decision of Forming Limit Diagram and its Appraising Standard

KES S – Q452**(EST)1991-02-01**

Contents

1. Scope of Application
2. Purpose
3. Definition of Terminology
4. Test Apparatus and Instrument
5. Test Condition
6. Test Method
7. Test Result Record
8. Standard of Analyzing and Remark

1. Scope of Application

This standard is applied to decide and appraise the forming limit diagram by the limit strain rate of every steel plates being used on car body panel forming.

2. Purpose

Forming limit diagram shows the maximum deformation without local necking in all strain state of thin steel plate.

So, it is using widely as a appraising tool of the forming ability when developing new thin plate forming process.

By indicating the main and sub strain rate of each parts on the forming limit diagram which is measured by testing work from designed and manufactured mold on the subjected material, it is possible to appraise the possibility and forming difficulty.

This standard is for using on the counter plan of Try-out process and site defect.

3. Definition of Terminology

The meanings of terminologies, which are used in this chapter, are as follows.

(1) Forming limit diagram (FLD)

Indicate the main and sub strain rate on the measured diagram which is at the limit point of rupture surface, and it is obtained by testing at the proportional weight route on the steel plate without restrain.

(2) The method of grid marking

Marking round or square grid on the steel plate by photo light sensing method or corrosion method to judge the strain distribution easily, which is resulted by measuring its strain state after forming the steel plate.

(3) Main strain rate / sub strain rate

When using the round grid marking method for measuring strain rate on the steel plate, mark the round grid on one surface of steel plate and the round become ellipse by deforming the plate. It is called main strain rate and sub strain rate respectively for the deforming rate of major axis and minor axis of the ellipse. Normal strain rate is used on this diagram.

$$\text{Main strain rate} = \frac{d_i - d_o}{d_o}$$

$$\text{Sub strain rate} = \frac{d_j - d_o}{d_o}$$

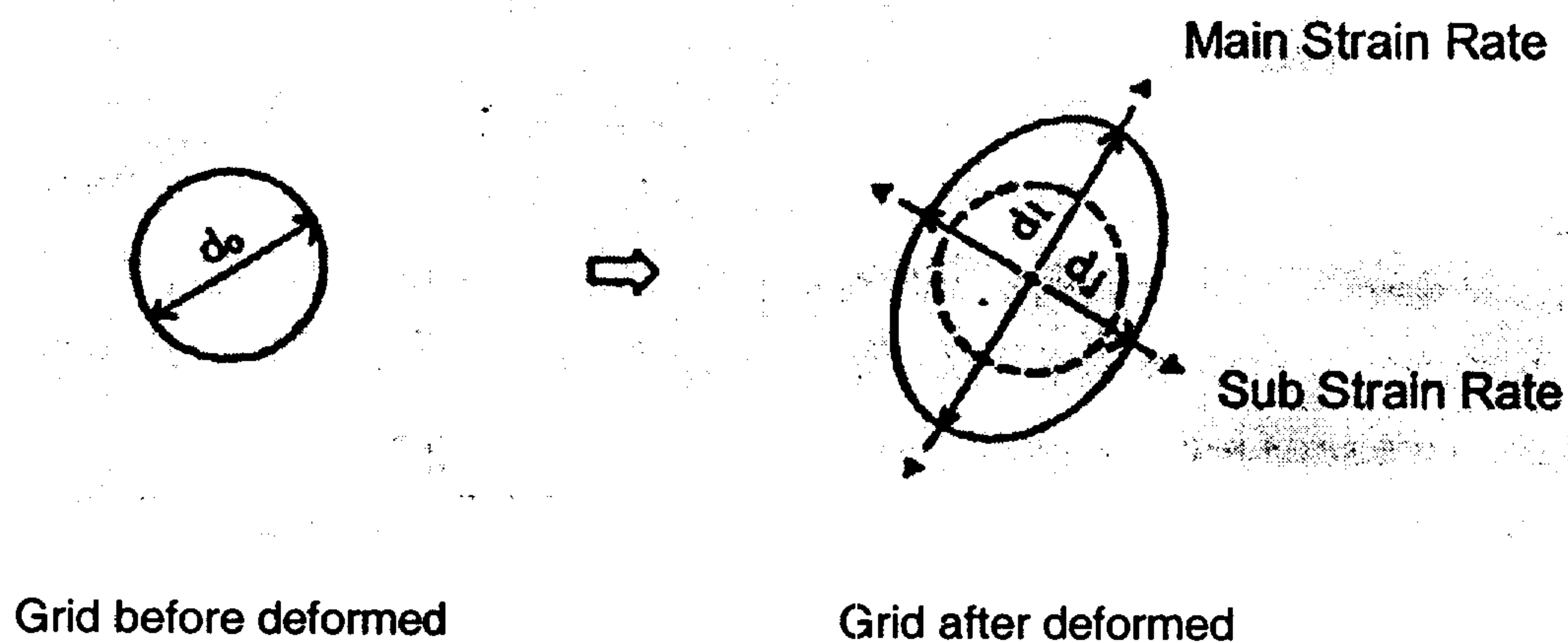


Figure 1 The grid before and after deformed

4. Test Apparatus and Instrument

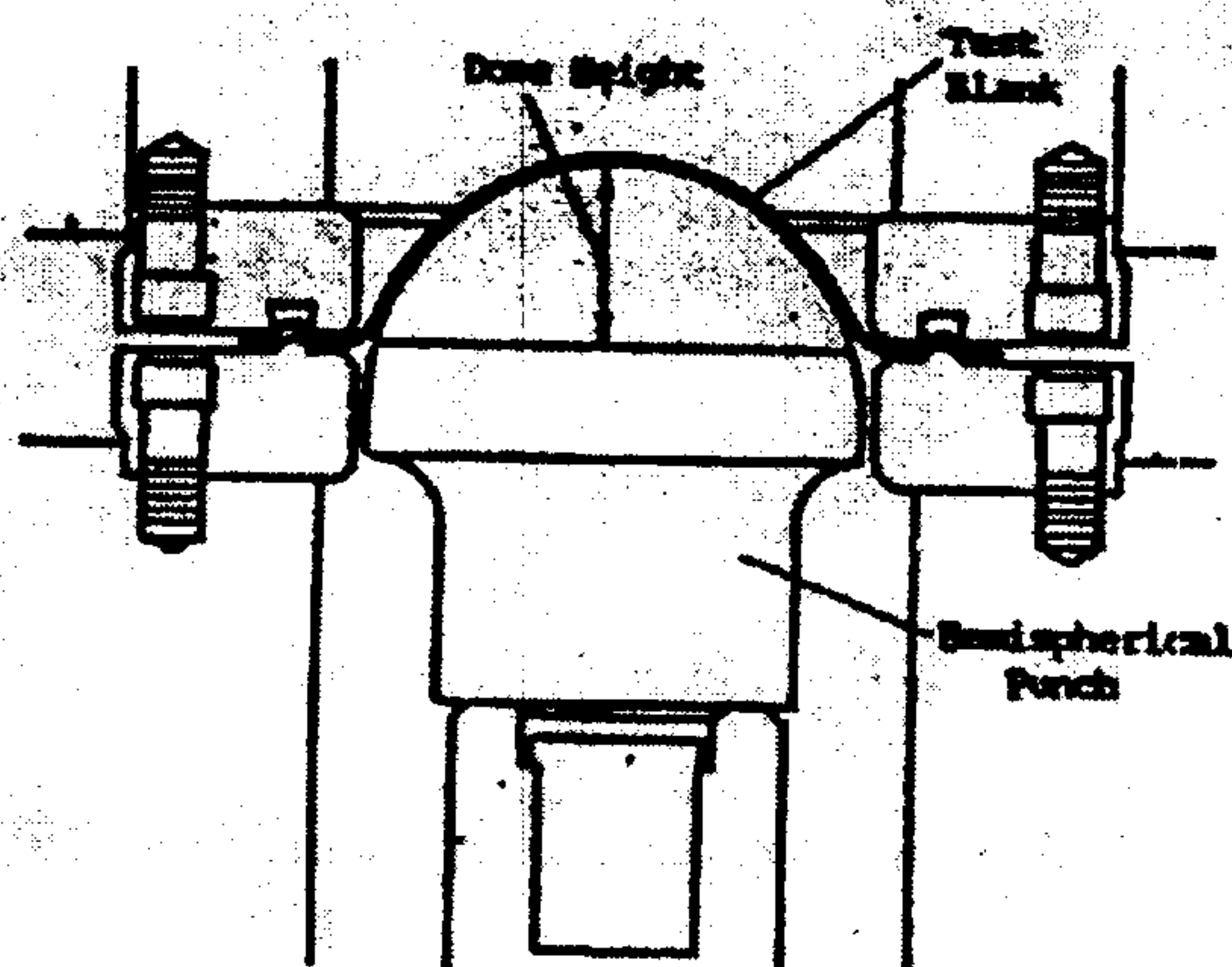


Figure 2 Sketch of punch stretching process