A change in lubrication can also improve the strain distribution of a stamping. If the strain over the punch is critical, the amount of stretch (strain) required to make the shape can be reduced by allowing metal to flow in over the punch. This is accomplished by decreasing the friction in the hold down area through the use of a more effective lubricant in this area.

If the part shape is critical, a change in material may help, that is, a material having a better uniform elongation will distribute the strain more uniformly, or a material having a higher "r" value will make it possible to "draw" in more metal from the hold down area so that less stretch is necessary to form the part.

Scribed Square Method—The basic technique is to draw a panel from a blank which has been scribed both longitudinally and transversely with a series of parallel lines spaced at 1 in (25.4 mm) intervals. The lines on the panel are measured after drawing and the stretch or draw calculated as the percent increase in area of a 1 in (25.4 mm) square. This is a fairly simple procedure for panels having generous radii and fairly even stretch or draw. A great many major panels fall in this category and in these instances it is quite easy to pick out the square area exhibiting the greatest increase.

If the square or line to be measured is no longer a flat surface, place a narrow strip of masking (or other suitable tape) on the formed surface and mark the points which are to be measured. Remove the tape, place on a plane surface, and determine the distance between the points with a steel scale.

There will be cases of minor increase in area with major elongation in the one direction. In these instances, the percent elongation should be recorded.

Thickness Method—There are instances when the maximum stretch is confined to an area smaller than 1 in^2 (25.4 mm^2) or the shape of the square has been distorted irregularly, making measurement difficult and calculation inaccurate. When either of these conditions exists, an electronic thickness gage may be used at the area in question or this area may be sectioned and the decrease in metal thickness measured with a ball point micrometer. The increase in unit area can be calculated by dividing the original thickness by the final thickness.

EXAMPLE—Assuming the blank thickness to be 0.035 in (0.889 mm) and the final thickness to be 0.028 in (0.7112 mm), the increase in unit area would be 0.035/0.028 = 1.25 (0.7112/0.889 = 1.25) or 25% increase in unit area.

(R) SHEET STEEL THICKNESS AND PROFILE—SAE J1058 APR91

SAE Recommended Practice

Report of Iron and Steel Technical Committee approved February 1976. Completely revised by the SAE Iron and Steel Technical Committee Division 32—Sheet and Strip Steel April 1991.

1. Scope—This SAE Recommended Practice provides methods for specifying thickness and thickness tolerances of sheet steel for automotive applications.

2. References

2.1 Applicable Documents—The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

2.1.1 ASTM PUBLICATIONS—Available from ASTM, 1916 Race Street, Philadelphia, PA 19103.

ASTM A 463-85—Specification for Steel Sheet, Cold-Rolled, Aluminum-Coated Type I and Type II

ASTM A 525M-86—Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process (metric)

ASTM A 568M-85a—Specification for General Requirements for Steel, Carbon and High-Strength Low Alloy Hot-Rolled Sheet and Cold-Rolled Sheet

ASTM A 792M-85a—Specification for Steel Sheet, Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

2.1.2 ISO PUBLICATIONS—Available from ANSI, 11 West 42nd Street, New York, NY 10036.

ISO 3574—Cold-reduced carbon steel sheet of commercial and drawing qualities

3. Specifying Thickness

TABLE 1 (METRIC)—THICKNESS TOLERANCES OF COLD ROLLED SHEET, ELECTROGALVANIZED SHEET, AND LONG TERNE SHEET (Thickness Measurements Include the Coating Where Applicable)

Specified Width mm Over	Specified Width mm Through	Thickness Tolerances Over, mm, No Tolerance Under Specified Minimum Thickness, mm Over 2.5 to 4.0 incl	Thickness Tolerances Over, mm, No Tolerance Under Specified Minimum Thickness, mm Over 1.2 to 2.5 incl	Thickness Tolerances Over, mm, No Tolerance Under Specified Minimum Thickness, mm Over 1.0 to 1.2 incl	Thickness Tolerances Over, mm, No Tolerance Under Specified Minimum Thickness, mm Over 0.4 to 1.0 incl	Thickness Tolerances Over, mm, No Tolerance Under Specified Minimum Thickness, mm Through 0.4
50	1800	0.15	0.12	0.10	0.08	0.05
1800	2000	0.18	0.15	0.10	0.08	—
2000	—	0.20	0.18	0.15	0.15	—

TABLE 2 (METRIC)—THICKNESS TOLERANCES OF HOT DIPPED ZINC COATED, ALUMINUM COATED, AND ALUMINUM-ZINC COATED SHEET (Thickness Measurements Include the Coating)

Specified Width mm Over	Specified Width mm Through	Thickness Tolerances Over, mm, No Tolerance Under Specified Minimum Thickness, mm Over 2.57 to 4.75 incl	Thickness Tolerances Over, mm, No Tolerance Under Specified Minimum Thickness, mm Over 1.90 to 2.57 incl	Thickness Tolerances Over, mm, No Tolerance Under Specified Minimum Thickness, mm Over 1.55 to 1.90 incl	Thickness Tolerances Over, mm, No Tolerance Under Specified Minimum Thickness, mm Over 1.09 to 1.55 incl	Thickness Tolerances Over, mm, No Tolerance Under Specified Minimum Thickness, mm Over 0.58 to 1.09 incl	Thickness Tolerances Over, mm, No Tolerance Under Specified Minimum Thickness, mm 0.58 and thinner
	810	0.21	0.18	0.15	0.13	0.10	0.08
810	1020	0.21	0.21	0.15	0.13	0.10	0.08
1020	1520	0.23	0.21	0.15	0.13	0.10	0.08
1520	1830	0.23	0.23	0.15	0.13	0.10	0.08