

perfect safety.

2.3 Grindstone The grindstone specified in JIS R 6210—Vitrified Grinding Stone, with the grading of 36~46 and the bonding of M~Q and the standard periphery speed of not less than 20 m/s shall be used.

2.4 Auxiliary Implements To avoid the effect of direct rays of sun, or when there is necessity to regulate the surrounding light, dark curtain, screen, dark cabinet, etc., shall be used.

3. Standard Specimen

3.1 It will be beneficial to prepare a various steels of known chemical composition in such convenient form as bars as standard specimen.

3.2 The determination of chemical composition shall conform to the analytical method specified by Japanese Industrial Standard.

3.3 The standard specimen must be cleared of decarburized layer, cementation, nitrided portion, remains of acetylen cutting, and must be capable of producing the representative spark for that material.

3.4 The standard specimen shall have been of the same origin as the product.

4. Test Method

4.1 General Rules for Test

4.1.1 The effort must be made to carry out the test under same condition using always the same implements.

4.1.2 As a rule, the test is carried out in a room suitably darkened.

When tested out of doors, in bright room or place, the direct rays of sun must be avoided on the spark, and regulate the brightness of background from interfering the clearness or the colour of the spark.

4.1.3 During the test, it is necessary to avoid the effect of the draft, especially avoid directing the spark against the direction of air stream.

4.1.4 The grinding of specimen must be carried out on the portion of the specimen which can produce the spark representing the chemical composition of the base metal. The decarburized layer of the surface, cemented surface, nitrided layer and scale produced in acetylen cutting give different kind of spark to the base metal, therefore, the use of these parts must be avoided.

4.1.5 The pressure of pressing specimen against the grinder, or the pressure of pressing the grinder on to the specimen must, as far as possible be kept equal with the pressure consistent to producing spark of 500 mm long of carbon steel containing C 0.2% as the standard.

Method of Spark Test for Steel

1. General

1.1 Scope This standard specifies method of spark test for steel ingot, steel billet, steel material and products, hereinafter referred to as the "steel material" by spark test with grinder, hereinafter referred to as the "test".

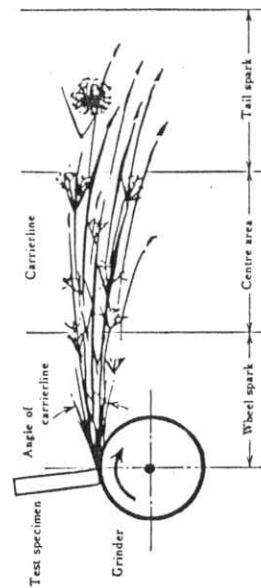
1.2 Object The object of this standard lies in the assumption of the kind of steel or the presence therein of other kind of materials.

1.3 Meaning of Terms The meaning of terms used in this standard is as given in the following:

(1) Classification of Steel When the steel is of unknown origin, it refers to an act of taking it for granted to its origin after an examination.

(2) Discrimination of Foreign Materials When the material is suspected of containing unknown substance, it refers to an act of discriminating its origin or if the material does not contain any such ingredients.

1.4 Name of Sparks The forms and names of sparks shall be as given in Fig. 1.



2. Implement

2.1 Test Implement In order to keep test condition into uniformity, it is desirable to use the same implement.

2.2 Grinder Either electric or pneumatic driven of rigid or portable type may be used, provided that the type is capable of producing good spark out of the specimen and permit grinding and observation under

4.1.6 The spark must be directed horizontally or slightly to upward direction, and the observation shall, as a rule, be made in receding direction of the spark, or from the direction at right angle to the stream.

4.1.7 The observation of spark shall be made on each section of wheel spark, centre area and tail spark taking particular care to note on the following characteristics:

- (1) Streamline (colour, number, brightness, length)
- (2) Bursting (colour, number, shape, size)
- (3) Resistance to grinding felt by hand

4.2 Classification Test on Steel

4.2.1 When steel is to be classified, a test is carried out according to 4.1-General Rules for Test, and on the basis of 5-Classification Standard by making observation on the characteristics of streamline and burst, and classify according to the carbon content and the kind of alloy base.

4.2.2 The classification of steel shall be made in the order given in 5.5.

4.2.3 After provisionally classifying steel according to the above order, make a further comparative test against the standard test piece of the steel to make necessary correction.

4.3 Determination Test of Foreign Substance

4.3.1 Carry out test upon standard test piece representing the steel to be tested and verify the spark by comparison.

4.3.2 Carry out test according to 4.1-General Rules on Test on all of the number the material to be tested, and on the basis of 5-Classification Base for Steel, and classify as given in the following:

- (1) When no deviation on the items under observation is found against standard material, the material is assumed to contain no foreign substance.
- (2) When more than one clear deviation is found against the standard piece, the ones showing the deviation shall be considered the foreign material.
- (3) If there is any item which can not be said identical with the standard, carry out chemical analysis or other test to ascertain its origin.

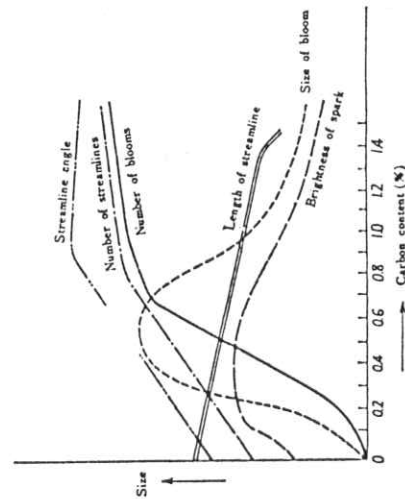
5. Classification Base of Steel The steel is classified according to the result of comparison against standard specimen, taking into account of the following spark characteristics and sketches.

5.1 Characteristic Spark of Carbon Steel (see Table 1, Fig. 2 and Fig. 3).

Table 1 Characteristics of Spark of Carbon Steel

C %	Streamline				Burst				Resistance
	Colour	Brightness	Length	Thickness	Number	Shape	Size	Dist	
0	Orange	Dark	Long	Thick	Less	2 bursts	Small	No burst	Soft
0.05						3 bursts		No burst	
0.1						Several bursts		No burst	
0.2						Several bursts in 2 large		No burst	
0.3						Several bursts in 3 large		No burst	
0.4						Commence to burst		No burst	
0.5						Burst		No burst	
0.6								No burst	
0.7								No burst	
0.8								No burst	
0.8 and over	Red	Dark	Short	Thin	More	Combustion	Small	Burst	Hard

Fig. 2 Characteristic Spark of Carbon Steel



5.2 Illustration of Carbon Steel Spark

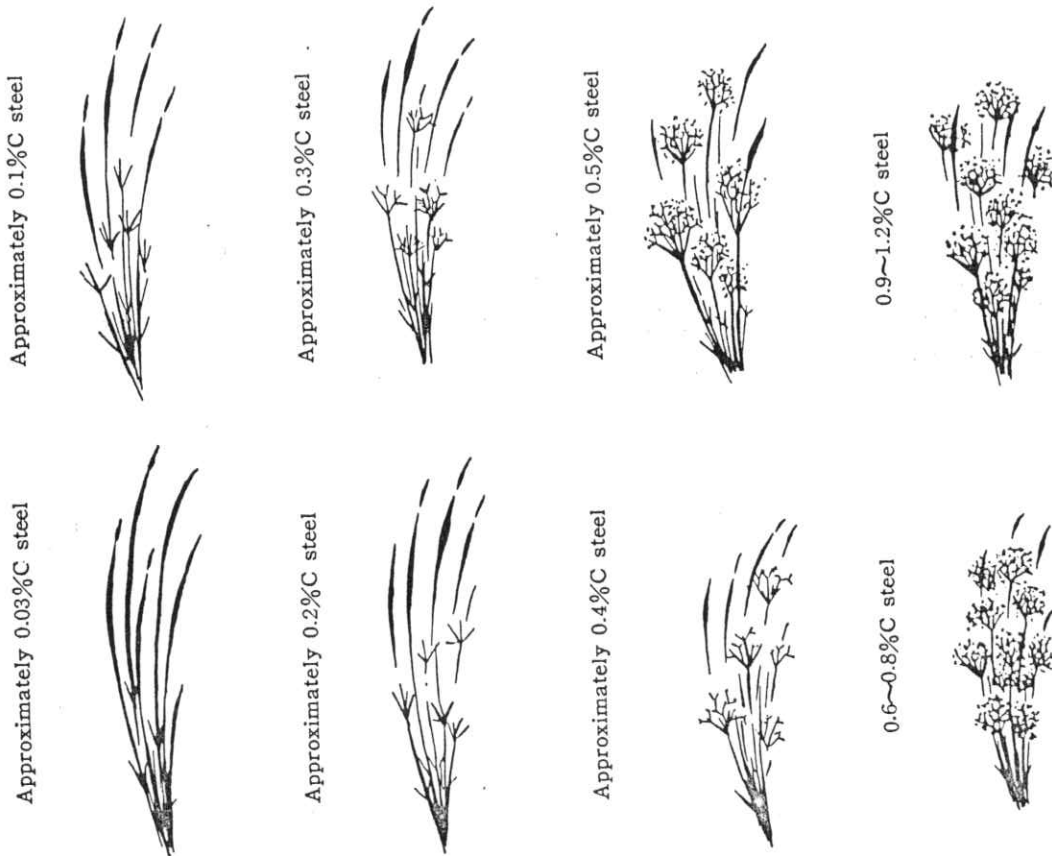


Fig. 3 Characteristics of Carbon Steel Spark (Carbon burst)

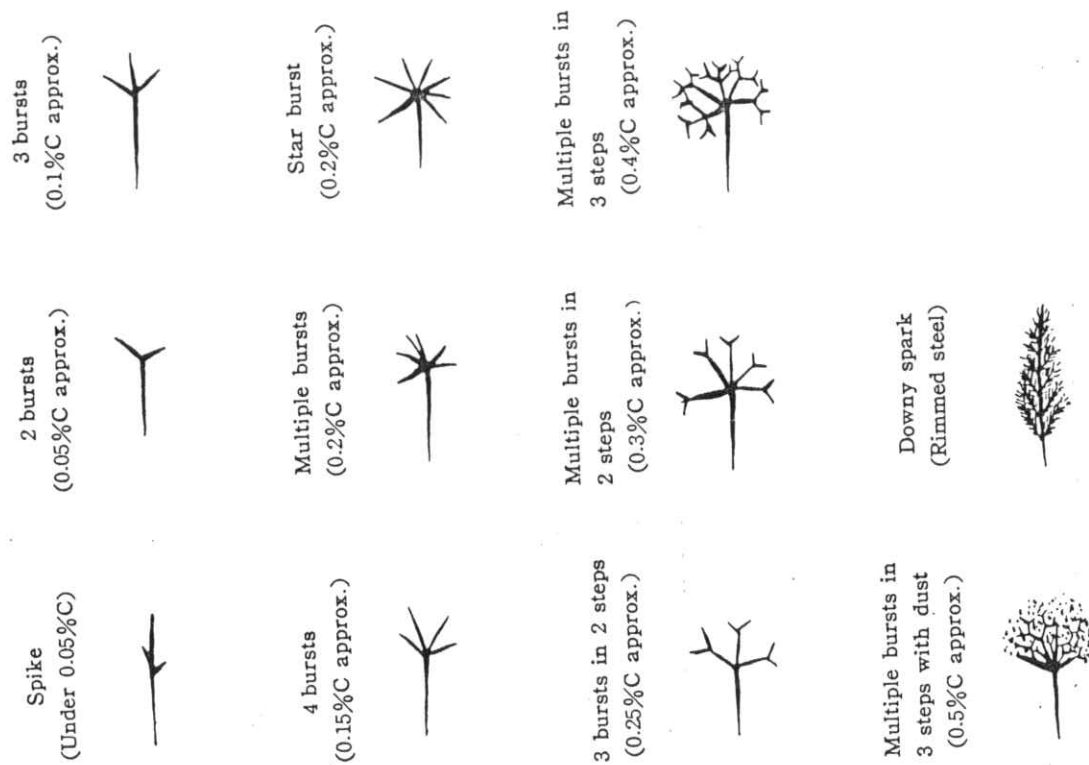
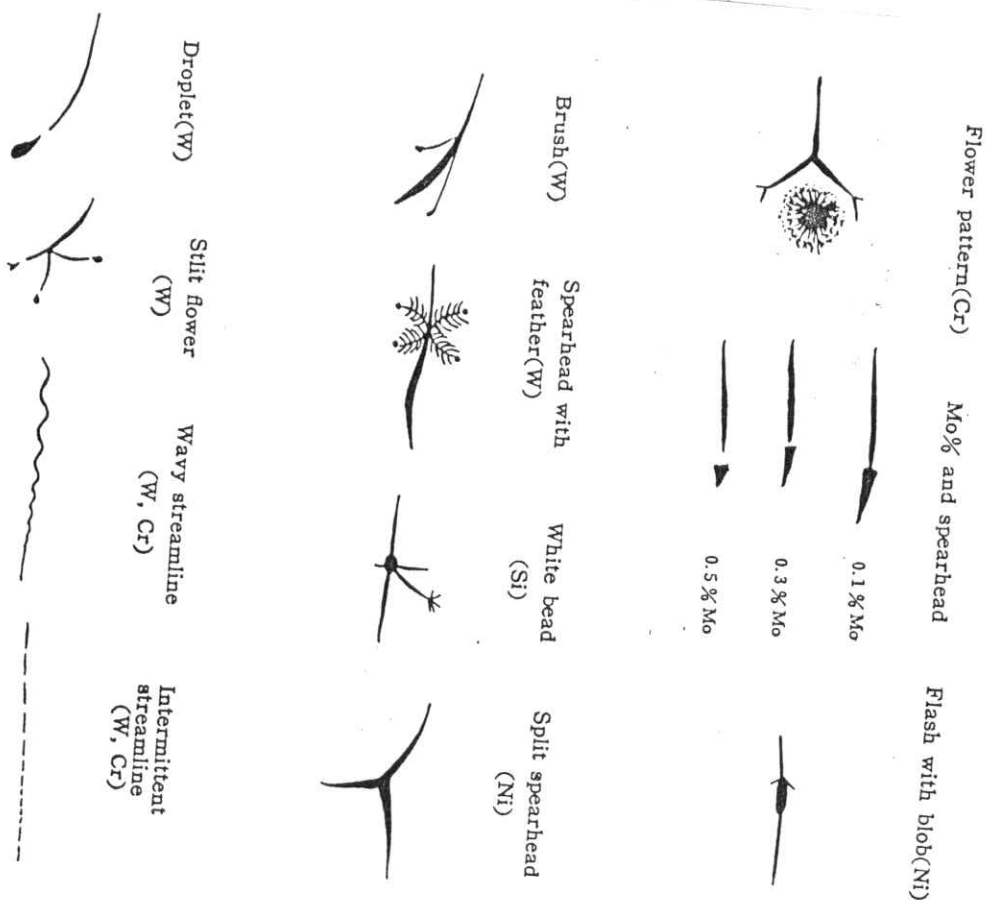


Table 2 Effect of Alloy Elements to Spark Characteristics

General classification	Additional element	Streamline				Burst				Resistance	Characteristics	
		Colour	Brightness	Length	Thickness	Colour	Shape	Dust	Number		Shape	Position
Increase carbon burst	Mn	Yellowish white	Bright	Short	Thick	White	Complicated, fine branch	Yes	Many	Soft	Dust	Centre
	Cr	Orange	Dark	Short	Fine	Orange	Flower pattern	Yes	Constant	Hard	Flower	Tip
	V	Change slight				Change slight	Fine		Many			
Reduce carbon burst	W	Darkish red	Dark	Short	Fine Wave Intermittent	Red	Brush, Droplet	No	Few	Hard	Tail	Tip
	Si	Yellow	Dark	Short	Thick	White	white bead	No	Few		White bead	Centre
	Ni	Yellow	Dark	Short	Fine	Yellow	Flash with blob	No	Few	Hard	Flash with blob	Centre
	Mo	Reddish orange	Dark	Long	Fine	Reddish orange	Spearhead	No	Few	Hard	Spearhead	Tip

Fig. 4 Characteristic Spark of Alloy Steel

—G 0566—



SUP 9



SKS 4



SKS 2



SKD 6



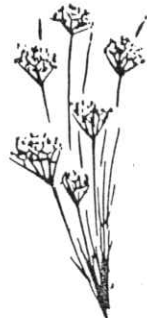
SKH 2



SUP 6



SKS 43



SKS 3



SKT 4



SKD 11



5.4 Illustration of Alloy Steel Spark

SCr 22



SCr 4



SUJ 2



SCM 21



SCM 4



3.5 % Ni Steel



SNC 21



SNC 2



SNCM 23



SNCM 9



5.5 Procedure for Assumption of Steel Classification The assumption of steel classification by spark test is given in Table 3-1 and Table 3-2.

5.5.1 The steel is broadly classified according to the presence or otherwise of carbon burst, into the group of carbon steel, low alloy steel group and high alloy steel group (see First Classification, Table 3-1. and First Classification, Table 3-2.)

5.5.2 For carbon steel, low alloy steel

- (1) Assume C% according to the extent of carbon burst, and classify into the group of below 0.25% C and over 0.25% C and below 0.5% C, exceeding 0.5% C (see Second Classification Table 3-1).
- (2) It may be assumed the steel may contain Ni, Cr, Si, Mn and Mo if C is below 0.5%, and if it exceed 0.5%, it contains W, V, etc. besides the elements mentioned. Examine the presence of the components to assume whether it is of carbon steel or low alloy steel (see Third Classification Table 3-1).
- (3) If the steel is of low alloy, take note of characteristics of special elements and assume the classification according to the kind and the quality of components.

5.5.3 For high alloy steel, the steel is classified mainly by the colour of the stream into stainless steel, heat resisting steel, high speed steel, high alloy tool steel (see Second and Third Classification Table 3-2). Since these alloys contain Ni, Cr, Mo, W, V, Co, steel can be classified according to the observed quantity and special components.

6. Safety The grinder and the use of grinder are prescribed by the Labour Standard Law and the Regulation Relating to Labour Safety and Sanitation.

SKH 3



SKH 4



SKH 9



SUS 24



SUS 27



SUS 32



SUH 3



SUH 31



SACM 1



SACM 1
nitrided portion



Table 3 (3-1) Assumption of Steel Classification

[illegible]

Table 3 (3-2)

[illegible]