## Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड़ नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 228-1 (1987): Methods of chemical analysis of steels, Part 1: Determination of carbon by volumetric method (for carbon 0.05 to 2.50 percent) [MTD 4: Wrought Steel Products]

"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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PART 1 DETERMINATION OF CARBON BY VOLUMETRIC METHOD
(FOR CARBON 0.05 TO 2.50 PERCENT)

*( Third Revision)*

*(Page* 3, *clause* 5.7, *Table* 1) -   Insert the following at the appropriate place and renumber the existing columns '(2) to '(22)':

Table 1 Correction Factors
*(clause 5.7)*

| Pressure, mmHg → / Temperature,OC ↓ | 700 | 702 | 704 | 706 | 708 | 710 | 712 | 714 | 716 | 718 | 720 | 722 | 724 | 726 | 728 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (I) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (II) | (12) | (13) | (14) | (1S) | (16) |
| IS | 0.924 | 0.927 | 0.929 | 0.932 | 0.935 | 0.937 | 0.940 | 0.943 | 0.945 | 0.948 | 0.951 | 0.954 | 0.956 | 0.959 | 0.962 |
| 16 | 0.920 | 0.922 | 0.925 | 0.928 | 0.930 | 0.930 | 0.936 | 0.938 | 0.941 | 0.944 | 0.946 | 0.949 | 0.952 | 0.9S4 | 0.957 |
| 17 | 0.915 | 0.918 | 0.921 | 0.923 | 0.926 | 0.929 | 0.931 | 0.934 | 0.937 | 0.939 | 0.942 | 0.945 | 0.947 | 0.9S0 | 0.953 |
| 18 | 0.911 | 0.914 | 0.916 | 0.919 | 0.922 | 0.924 | 0.927 | 0.929 | 0.932 | 0.935 | 0.937 | 0.940 | 0.943 | 0.945 | 0.948 |
| 19 | 0.906 | 0.909 | 0.912 | 0.914 | 0.917 | 0.920 | 0.922 | 0.925 | 0.928 | 0.930 | 0.933 | 0.936 | 0.938 | 0.941 | 0.944 |
| 20 | 0.902 | 0.904 | 0.907 | 0.910 | 0.912 | 0.915 | 0.918 | 0.920 | 0.923 | 0.926 | 0.928 | 0.931 | 0.934 | 0.936 | 0.939 |
| 21 | 0.897 | 0.900 | 0.903 | 0.905 | 0.908 | 0.910 | 0.913 | 0.916 | 0.918 | 0.921 | 0.924 | 0.926 | 0.929 | 0.932 | 0.934 |
| 22 | 0.893 | 0.89S | 0.898 | 0.901 | 0.903 | 0.906 | 0.908 | 0.911 | 0.914 | 0.916 | 0.919 | 0.922 | 0.924 | 0.927 | 0.930 |
| 23 | 0.888 | 0.891 | 0.893 | 0.896 | 0.899 | 0.901 | 0.904 | 0.906 | 0.909 | 0.912 | 0.914 | 0.917 | 0.912 | 0.922 | 0.925 |
| 24 | 0.8&3 | 0.886 | 0.889 | 0.891 | 0.894 | 0.896 | 0.899 | 0.902 | 0.904 | 0.907 | 0.910 | 0.912 | 0.915 | 0.917 | 0.920 |
| 2S | 0.879 | 0.881 | 0.884 | 0.886 | 0.889 | 0.892 | 0.894 | 0.897 | 0.900 | 0.902 | 0.905 | 0.907 | 0.910 | 0.912 | 0.915 |
| 26 | 0.874 | 0.816 | 0.819 | 0.882 | 0.884 | 0.881 | 0.889 | 0.892 | 0.894 | 0.897 | 0.900 | 0.902 | 0.90S | 0.908 | 0.910 |
| 27 | 0.869 | 0.872 | 0.874 | 0.871 | 0.879 | 0.882 | 0.884 | 0.881 | 0.890 | 0.892 | 0.895 | 0.897 | 0.900 | 0.902 | 0.905 |
| 28 | 0.864 | 0.867 | 0.869 | 0.872 | 0.874 | 0.877 | 0.879 | 0.882 | 0.885 | 0.881 | 0.890 | 0.892 | 0.895 | 0.898 | 0.900 |
| 29 | 0.859 | 0.862 | 0.864 | 0.867 | 0.869 | 0.872 | 0.874 | 0.877 | 0.880 | 0.882 | 0.885 | 0.887 | 0.890 | 0.892 | 0.895 |
| 30 | 0.854 | 0.856 | 0.859 | 0.862 | 0.864 | 0.867 | 0.869 | 0.872 | 0.874 | 0.877 | 0.879 | 0.882 | 0.884 | 0.887 | 0.890 |
| 31 | 0.849 | 0.851 | 0.854 | 0.856 | 0.859 | 0.861 | 0.864 | 0.866 | 0.869 | 0.872 | 0.874 | 0.877 | 0.87Q | 0.882 | 0.884 |
| 32 | 0.843 | 0.846 | 0.848 | 0.851 | 0.854 | 0.856 | 0.859 | 0.861 | 0.864 | 0.866 | 0.869 | 0.871 | 0.874 | 0.876 | 0.879 |
| 33 | 0.838 | 0.840 | 0.843 | 0.846 | 0.848 | 0.851 | 0.853 | 0.856 | 0.858 | 0.861 | 0.863 | 0.866 | 0.868 | 0.871 | 0.873 |
| 34 | 0.833 | 0.835 | 0.838 | 0.840 | 0.843 | 0.845 | 0.848 | 0.850 | 0.853 | 0.855 | 0.858 | 0.860 | 0.863 | 0.865 | 0.868 |
| 35 | 0.827 | 0.830 | 0.832 | 0.834 | 0.837 | 0.840 | 0.842 | 0.845 | 0.847 | 0.850 | 0.852 | 0.8S5 | 0.857 | 0.860 | 0.862 |
| 36 | 0.821 | 0.824 | 0.826 | 0.829 | 0.831 | 0.834 | 0.836 | 0.839 | 0.841 | 0.844 | 0.846 | 0.849 | 0.8S1 | 0.8S4 | 0.856 |
| 37 | 0.816 | 0.818 | 0.820 | 0.823 | 0.826 | 0.828 | 0.830 | 0.833 | 0.836 | 0.838 | 0.840 | 0.843 | 0.846 | 0.848 | 0.8S0 |
| 38 | 0.810 | 0.812 | 0.81S | 0.817 | 0.820 | 0.822 | 0.825 | 0.827 | 0.830 | 0.832 | 0.834 | 0.837 | 0.840 | 0.842 | 0.844 |
| 39 | 0.804 | 0.806 | 0.809 | 0.811 | 0.814 | 0.816 | 0.818 | 0.821 | 0.824 | 0.826 | 0.828 | 0.831 | 0.833 | 0.836 | 0.838 |
| 40 | 0.798 | 0.800 | 0.802 | 0.805 | 0.807 | 0.810 | 0.812 | 0.81S | 0.817 | 0.820 | 0.822 | 0.825 | 0.827 | 0.830 | 0.832 |
| 41 | 0.791 | 0.794 | 0.796 | 0.799 | 0.801 | 0.804 | 0.806 | 0.808 | 0.811 | 0.813 | 0.816 | 0.818 | 0.821 | 0.823 | 0.826 |
| 42 | 0.785 | 0.787 | 0.790 | 0.792 | 0.795 | 0.797 | 0.800 | 0.802 | 0.804 | 0.807 | 0.809 | 0.812 | 0.814 | 0.817 | 0.819 |
| 43 | 0.778 | 0.781 | 0.783 | 0.786 | 0.788 | 0.791 | 0.793 | 0.796 | 0.798 | 0.800 | 0.803 | 0.805 | 0.808 | 0.810 | 0.8]3 |
| 44 | 0.772 | 0.774 | 0.776 | 0.779 | 0.781 | 0.784 | 0.786 | 0.789 | 0.791 | 0.794 | 0.796 | 0.798 | 0.801 | 0.803 | 0.806 |
| 45 | 0.765 | 0.761 | 0.770 | 0.772 | 0.77S | 0.777 | 0.179 | 0.782 | 0.784 | 0.787 | 0.789 | 0.792 | 0.794 | 0.796 | 0.199 |

(MTD4)

*Indian Standard*

# METHODS FOR CHEMICAL ANALYSIS OF STEELS

## PART 1 DETERMINATION OF CARBON BY VOLUMETRIC METHOD
### ( FOR CARBON 0·05 TO 2'50 PERCENT)

### ( *Third Revision*)

**1. Scope** -  This standard (Part 1 ) covers  volumetric  method  for  determination of  carbon  in  the range 0'05 to 2'50 percent in plain carbon, low alloy and high alloys steels.

**2. Determination of Carbon**

2.1 *Outline of the Method* -  The sample is burnt in a current of pure oxygen in presence of a suitable flux.  Combustion of the sample in a stream of oxygen, thus converts all the carbon present to carbon dioxide. After removal of sulphurous gases by suitable absorbents, the carbon dioxide gas is collected in a specially jacketed burette along with excess of oxygen.  The carbon dioxide is then absorbed in alkali.  On passing the excess oxygen back to the burrette, the contraction in volume is read against a scale, calibrated directly to the percentage of carbon.

**3. Sampling** -  The sarnple  shall  be  drawn  as  prescribed  in  the  relevant  Indian Standard.  (The sample is cleaned  with organic  solvent  like  ether  or  acetone, dried  in  an  air oven at 100·' ± 5°C before use. )

**4. Apparatus** -  The apparatus recommended in IS : 6226  (Part 1 )-1971  'Recommendatlons for apparatus for  chemical  analysis  of metals: Part 1  Determination  of carbon  by  direct  combustion method' may be used.

**5. Procedure**

5.1  Before use the  apparatus should  be tested  for  satisfactory  working  against  standard  steel of appropriate values of  carbon.

5.2 *For Plain Carbon Steel*- Take  one gram of an  accurately  weighed  and clean sample free from extraneous carbon in the form of small dnllinqs  or  shavings in a porcelain boat  which can  withstand a temperature of 1 150°C without breaking or  cracking,

5.2.1 Introduce  the  boat  into  the  hot  combustion  tube  in  the  furnace  kept  at  1 000°  1 1 100°C.

5.3 *For Low Alloy and High Alloy Steels* -  Take  one gram  of  an  accurately  weighed  and  clean sample free from  extraneous carbon  in  the form  of small  drillings  or shavings  in a porcelain boat, which can  stand a temperature of 1 250°C  without breaking and  cracking.  Spread 0'5 g of pure tin granules over the sample.  In case  of  high alloy steel mix  the  sample with 0"5 9 of pure iron (99'99 percent) filings also.  Introduce  the  boat into  the  hot  combustion tube  in the  furnace, kept between 1 150°  to 1 250°C.

6.4 Close the furnace  inlet with a rubber stopper, allow the sample to heat for one to one  and a half minute.  Regulate the flow  of oxygen  to  300-400 ml  per  minute  into  the  furnace  and  establish connection  with  the  burette,  which  has  been  previously  filled  with  acidulated  water/brine  water coloured with  methyl red,  so that the liquid  level in the bulbed  portion of the gas burette does not fall rapidly.  After a minute or so the level of water in the burette begins to fall more rapidly,  though the same rate of oxygen is maintained, indicating completion of combustion.

5.6 Take  readings, when the  level reaches  near the zero  graduation mark after closing the bend way stopcock and equalizing the levels of the burette and the  connected  levelling bottle.  Pass the

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(sidebar, left margin) Methods of Chemical Analysis of Ferrous Metals Sectional Committee. SMoC 2  Ref : Doc : SMD 2  3265 )]

collected and measured gas twice into the absorbing bulb, till constant reading is obtained, Record the burette reading. On the basis of one gram of sample taken for analysis, the burette is graduated to measure directly the percsntrqa of carbon.

6.5.1 Examine the combustion boat for complete fusion of the sample, if not thoroughly fused, repeat the determination with a fresh sample.

*5.6 Blank* - Run a blank experiment on the same quantity of accelerators used, without any sample and make the appropriate corrections.

*6.7 Calculation*

$$\text{Carbon, percent} = (A - B) \times F$$

where

$A =$ burette reading after absorption of carbon dioxide in caustic potash with one gram of sample,

$8 =$ burette reading for the blank experiment, and

$F =$ Correction teeter for temperature and pressure *(see* Table 1 ).

*5.8 Reproducibility* - :1:0·01 percent up to 1'50 percent carbon, and
±0·02 percent above 1"50 percent carbon.

# APPENDIX A

## INDIAN STANDARDS ON METHODS FOR CHEMICAL ANALYSIS OF STEELS

IS : 228 Methods for chemical analysis of steels:

(Part 2 )-1987 Determination of manganese in plain carbon and low alloy steels by arsenite method *(third revision)*

(Part 3)-1987 Determination of phosphorus by alkalimetric method *(third revision)*

(Part 4)-1987 Determination of carbon by gravimetric method (for carbon $>$ 0"1 percent) *(third revision)*

(Part 5 )-1987 Determination of nickel by dlmethvlqlvoxirne (gravimetric) method ( for nickel $>$ 0"1 percent) *(third revision)*

(Part 6 )-1987 Determination of chromium by persulphate oxidation method ( for chromium $\geqslant$ 0'1 percent) *(third revision)*

(Part 7 )-1974 Determination of molybdenum by e-benzoinoxime method ( for molybdenum $>$ 1 percent) *(second revision)*

(Part 8 )-1975 Determination of silicon bv the gravimetric method (for silicon $\geqslant$ 0"1 percent) *(second revision)*

(Part 9 )-1975 Determination of sulphur in plain carbon steels by evolution method ( *second revision)*

( Part 10)..1976 Determination of molybdenum by thiocyanate (photometric) method ( for molybdenum up to 1 percent) in low and high alloy steels *(second revision)*

( Part 11 )-1976 Determination of silicon by photometric method in carbon steels and low alloy steels ( for silicon 0'01 to 0·05 percent) *(second revision)*

( Part 12 )-1988 Determination of manganese by pertodate (spectrophotometric) method in low and high alloy steels (for manganese up to 0·01 to 2·00 percent) *(second revision)*

( Part 13 )-1982 Determination of arsenic

( Part 14 )-1987 Determination of carbon by thermal conductivity method (for carbon 0'005 to 2·000 percent)

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TABLE 1  CORRECTION FACTORS

( Clause 5,7 )

| Pressure, mm Hg → Temperature, °C | 730 | 732 | 734 | 736 | 738 | 740 | 742 | 744 | 746 | 748 | 750 | 752 | 754 | 756 | 758 | 760 | 762 | 764 | 766 | 768 | 770 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (20) | (21) | (22) |
| 15 | 0·964 | 0·967 | 0·970 | 0·972 | 0·975 | 0·978 | 0·980 | 0·983 | 0·986 | 0·988 | 0·991 | 0·994 | 0·996 | 0·999 | 1·002 | 1·005 | 1·007 | 1·010 | 1·013 | 1·015 | 1·018 |
| 16 | 0·960 | 0·962 | 0·965 | 0·968 | 0·970 | 0·973 | 0·976 | 0·978 | 0·981 | 0·984 | 0·987 | 0·989 | 0·992 | 0·995 | 0·997 | 1·000 | 1·003 | 1·005 | 1·008 | 1·011 | 1·013 |
| 17 | 0·955 | 0·958 | 0·961 | 0·963 | 0·966 | 0·969 | 0·971 | 0·974 | 0·977 | 0·979 | 0·982 | 0·985 | 0·987 | 0·990 | 0·993 | 0·995 | 0·998 | 1·001 | 1·003 | 1·006 | 1·009 |
| 18 | 0·951 | 0·953 | 0·956 | 0·959 | 0·961 | 0·964 | 0·967 | 0·969 | 0·972 | 0·975 | 0·977 | 0·980 | 0·983 | 0·985 | 0·988 | 0·991 | 0·993 | 0·996 | 0·999 | 1·001 | 1·004 |
| 19 | 0·946 | 0·949 | 0·952 | 0·954 | 0·957 | 0·959 | 0·962 | 0·965 | 0·967 | 0·970 | 0·973 | 0·975 | 0·978 | 0·981 | 0·983 | 0·986 | 0·989 | 0·991 | 0·994 | 0·996 | 0·999 |
| 20 | 0·942 | 0·944 | 0·947 | 0·950 | 0·952 | 0·955 | 0·957 | 0·960 | 0·963 | 0·965 | 0·968 | 0·971 | 0·973 | 0·976 | 0·978 | 0·981 | 0·984 | 0·986 | 0·989 | 0·992 | 0·994 |
| 21 | 0·937 | 0·939 | 0·942 | 0·945 | 0·947 | 0·950 | 0·953 | 0·955 | 0·958 | 0·961 | 0·963 | 0·966 | 0·968 | 0·971 | 0·974 | 0·976 | 0·979 | 0·982 | 0·984 | 0·987 | 0·990 |
| 22 | 0·932 | 0·935 | 0·937 | 0·940 | 0·943 | 0·945 | 0·948 | 0·950 | 0·953 | 0·956 | 0·958 | 0·961 | 0·964 | 0·966 | 0·969 | 0·972 | 0·974 | 0·977 | 0·979 | 0·982 | 0·985 |
| 23 | 0·927 | 0·930 | 0·933 | 0·935 | 0·938 | 0·940 | 0·943 | 0·946 | 0·948 | 0·951 | 0·954 | 0·956 | 0·959 | 0·961 | 0·964 | 0·967 | 0·969 | 0·972 | 0·974 | 0·977 | 0·980 |
| 24 | 0·922 | 0·925 | 0·928 | 0·930 | 0·933 | 0·936 | 0·938 | 0·941 | 0·943 | 0·946 | 0·949 | 0·951 | 0·954 | 0·956 | 0·959 | 0·962 | 0·964 | 0·967 | 0·969 | 0·972 | 0·975 |
| 25 | 0·918 | 0·920 | 0·923 | 0·925 | 0·928 | 0·931 | 0·933 | 0·936 | 0·938 | 0·941 | 0·944 | 0·946 | 0·949 | 0·951 | 0·954 | 0·957 | 0·959 | 0·962 | 0·964 | 0·967 | 0·970 |
| 26 | 0·913 | 0·915 | 0·918 | 0·920 | 0·923 | 0·926 | 0·928 | 0·931 | 0·933 | 0·936 | 0·939 | 0·941 | 0·944 | 0·946 | 0·949 | 0·952 | 0·954 | 0·957 | 0·959 | 0·962 | 0·964 |
| 27 | 0·908 | 0·910 | 0·913 | 0·915 | 0·918 | 0·921 | 0·923 | 0·926 | 0·928 | 0·931 | 0·934 | 0·936 | 0·939 | 0·941 | 0·944 | 0·946 | 0·949 | 0·952 | 0·954 | 0·957 | 0·959 |
| 28 | 0·903 | 0·905 | 0·908 | 0·910 | 0·913 | 0·916 | 0·918 | 0·921 | 0·923 | 0·926 | 0·928 | 0·931 | 0·934 | 0·936 | 0·939 | 0·941 | 0·944 | 0·946 | 0·949 | 0·952 | 0·954 |
| 29 | 0·897 | 0·900 | 0·903 | 0·905 | 0·908 | 0·910 | 0·913 | 0·915 | 0·918 | 0·920 | 0·923 | 0·926 | 0·928 | 0·931 | 0·933 | 0·936 | 0·938 | 0·941 | 0·944 | 0·946 | 0·949 |
| 30 | 0·892 | 0·895 | 0·897 | 0·900 | 0·902 | 0·905 | 0·908 | 0·910 | 0·913 | 0·915 | 0·918 | 0·920 | 0·923 | 0·925 | 0·928 | 0·930 | 0·933 | 0·936 | 0·938 | 0·941 | 0·943 |
| 31 | 0·887 | 0·889 | 0·892 | 0·894 | 0·897 | 0·900 | 0·902 | 0·905 | 0·907 | 0·910 | 0·912 | 0·915 | 0·917 | 0·920 | 0·922 | 0·925 | 0·928 | 0·930 | 0·933 | 0·935 | 0·938 |
| 32 | 0·882 | 0·884 | 0·886 | 0·889 | 0·892 | 0·894 | 0·897 | 0·899 | 0·902 | 0·904 | 0·907 | 0·909 | 0·912 | 0·914 | 0·917 | 0·920 | 0·922 | 0·925 | 0·927 | 0·930 | 0·932 |
| 33 | 0·876 | 0·878 | 0·881 | 0·884 | 0·886 | 0·889 | 0·891 | 0·894 | 0·896 | 0·899 | 0·901 | 0·904 | 0·906 | 0·909 | 0·911 | 0·914 | 0·916 | 0·919 | 0·922 | 0·924 | 0·927 |
| 34 | 0·870 | 0·873 | 0·875 | 0·878 | 0·880 | 0·883 | 0·886 | 0·888 | 0·891 | 0·893 | 0·896 | 0·898 | 0·901 | 0·903 | 0·906 | 0·908 | 0·911 | 0·913 | 0·916 | 0·918 | 0·921 |
| 35 | 0·865 | 0·867 | 0·870 | 0·872 | 0·875 | 0·877 | 0·880 | 0·882 | 0·885 | 0·887 | 0·890 | 0·892 | 0·895 | 0·897 | 0·900 | 0·902 | 0·905 | 0·907 | 0·910 | 0·912 | 0·915 |
| 36 | 0·859 | 0·861 | 0·864 | 0·866 | 0·869 | 0·871 | 0·874 | 0·876 | 0·879 | 0·882 | 0·884 | 0·886 | 0·889 | 0·892 | 0·894 | 0·896 | 0·899 | 0·902 | 0·904 | 0·906 | 0·909 |
| 37 | 0·853 | 0·856 | 0·858 | 0·860 | 0·863 | 0·865 | 0·868 | 0·870 | 0·873 | 0·876 | 0·878 | 0·880 | 0·883 | 0·886 | 0·888 | 0·890 | 0·893 | 0·896 | 0·898 | 0·900 | 0·903 |
| 38 | 0·847 | 0·850 | 0·852 | 0·854 | 0·857 | 0·859 | 0·862 | 0·864 | 0·867 | 0·869 | 0·872 | 0·874 | 0·877 | 0·879 | 0·882 | 0·884 | 0·887 | 0·889 | 0·892 | 0·894 | 0·897 |
| 39 | 0·841 | 0·843 | 0·846 | 0·848 | 0·851 | 0·853 | 0·856 | 0·858 | 0·861 | 0·863 | 0·866 | 0·868 | 0·871 | 0·873 | 0·876 | 0·878 | 0·881 | 0·883 | 0·886 | 0·888 | 0·890 |
| 40 | 0·835 | 0·837 | 0·840 | 0·842 | 0·844 | 0·847 | 0·850 | 0·852 | 0·854 | 0·857 | 0·859 | 0·862 | 0·864 | 0·867 | 0·869 | 0·872 | 0·874 | 0·877 | 0·879 | 0·882 | 0·884 |
| 41 | 0·828 | 0·831 | 0·833 | 0·836 | 0·838 | 0·841 | 0·843 | 0·845 | 0·848 | 0·850 | 0·853 | 0·855 | 0·858 | 0·860 | 0·863 | 0·865 | 0·868 | 0·870 | 0·873 | 0·875 | 0·878 |
| 42 | 0·822 | 0·824 | 0·827 | 0·829 | 0·832 | 0·834 | 0·836 | 0·839 | 0·841 | 0·844 | 0·846 | 0·849 | 0·851 | 0·854 | 0·856 | 0·859 | 0·861 | 0·864 | 0·866 | 0·868 | 0·870 |
| 43 | 0·815 | 0·818 | 0·820 | 0·822 | 0·825 | 0·827 | 0·830 | 0·832 | 0·835 | 0·837 | 0·840 | 0·842 | 0·844 | 0·847 | 0·849 | 0·852 | 0·854 | 0·857 | 0·859 | 0·862 | 0·864 |
| 44 | 0·808 | 0·811 | 0·813 | 0·816 | 0·818 | 0·820 | 0·823 | 0·825 | 0·828 | 0·830 | 0·833 | 0·835 | 0·838 | 0·840 | 0·842 | 0·845 | 0·847 | 0·850 | 0·852 | 0·855 | 0·857 |
| 45 | 0·801 | 0·804 | 0·806 | 0·809 | 0·811 | 0·814 | 0·816 | 0·818 | 0·821 | 0·823 | 0·826 | 0·828 | 0·830 | 0·833 | 0·835 | 0·838 | 0·840 | 0·843 | 0·845 | 0·848 | 0·850 |

# EXPLANATORY NOTE

15: 228 was issued as a tentative standard in 1952 and revised in 1959, covering the chemical analysis of pig iron, cast iron and plain carbon and low alloy steels. For the convenience, it was decided to publish comprehensive series on chemical analysis of steels including high alloy steels and another series on chemical analysis of pig iron and cast iron. Accordingly, chemical analysis of steels was published in various parts. This standard is series of parts on Chemical analysis of steels. The other parts published are given in Appendix A. The chemical analysis of pig iron and cast iron is being published in separate standard.

In this revision the major modifications are as follows:

a) The limit of determination of carbon in steel have been modified as 0'05 to 2'50 percent in place of greater than or equal to 0'1 percent.

b) The range of pressure for the correction factors in .Table 1 have been incorporated from 730 to 770 instead of 700 to 770.

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