BUREAU OF INDIAN STANDARDS
(Eastern Region Office, Kolkata)

DRAFT PRODUCT CERTIFICATION MANUAL FOR COMMENTS

Our Ref: DDGE/22/IS 277 Dated: 20 Feb 2014

Sub: Draft manual for IS 277

This has reference to CMD circular CMD:1/31 dated:11 Nov 2013 on the above subject. In this connection, please find enclosed the draft product certification manuals as per details below:

GALVANIZED STEEL SHEETS (PLAIN AND CORRUGATED)

Kindly examine the draft product certification manual and forward your comments on the draft to ERO at ero@bis.org.in , in the format given below:

Sl no	Clause no/page no	Comments

Last date for comments: 05 March 2014.

(Product Certification Officer)
ERO

PM/IS 277
Revision Number 00
Effective Date

PRODUCT MANUAL

GALVANIZED STEEL SHEETS (PLAIN AND CORRUGATED)

B U R E A U O F I N D I A N S T A N D A R D S
MA N A K B H A V A N 9 B. S. Z A F A R M A R G
NEW DELHI 110002

BUREAU OF INDIAN STANDARDS	PRODUCT MANUAL FOR CERTIFICATION OF GALVANIZEDSTEEL (PLAIN AND ORRUGATED) AS PER IS 277:2003
PREPARED BY : GHBO	APPROVED BY

Amendment Sheet:

To ensure that this Product Manual contains a complete record of Amendments, this Amendment sheet shall be maintained in the Product Manual.

NO.	DATE	PAGE NO.
1	July 2005	
2	August 2008	
3	February 2009	
4	June 2011	

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Amendment No. 1 JULY 2005
TO

IS 277: 2003 GALVANIZED STEEL SHEETS (PLAIN AND CORRUGATED) - SPECIFICATION
(Sixth Revision)

(Page 1, *clause* 6) - Substitute the following for the existing table:

Table 1 Classification of Grades of *GP/GC* Coils and Sheets

(Clause 6)

Sl No.	Type	Designation	Grade Reference of Base Metal in IS l079/IS513
(I)	(2)	(3)	(4)
i)	Deep drawing	GPO	Grade DD
ii)	Extra deep drawing	OPED	Grade EDD
iii)	Corrugated ordinary	GC	Grade 0

NOTES

1 Spangles shall not be allowed to sheers during galvanizing form on the surface of zero spangled strips

2 If grade designation GP is of IS 513 the purchaser, it may be manufactured from Grade 0

(Page 2. *clause* 8.1, *last line)* - Substitute the following for the existing:

'However, bend test shall not be applicable to GC grade of sheets intended for corrugation. '

AMENDMENT NO.2 AUGUST 2008
TO
IS 277 : 2003 GALVANIZED STEEL SHEETS
(PLAIN AND CORRUGATED) - SPECIFICATION

(Sixth Revision)

{Page 1, *clause* 6 *(see also Amendment No.1)]* - Insert the following grades in the existing table:

SI No.	Type	Designation	Grade Referen(c of Base Metal IS I079/1S 513
(I)	(2)	(3)	(4)
v)	Ordinary	OP	Grade 0
vi)	Ordinary-Hard	GPH	Grade0
vii)	lock Forming	GPL	Grade 0

(Page I, *clause* 5.2) - Insert the following new clause after 5.2:

Passivation shall be carried out on the surface, if agreed to between the Purchaser and the manufacturer.'

.*(Page* 2, *clause* 7.4) - Insert the following new clause after 7.4:

If agreed to between the purchaser and the manufacturer, the grade of Coatings 100 and 80 may be used for non-critical applications other than roofing. The mass of coating in such cases shall be as follows:

Grade of Coating	Minimum Average Coating Triple Spot Test gm/m²	Minimum Coating Single Spot Test gm/m²
(1)	(2)	(3)
100	100	90
80	80	75

NOTE - For the above grade of coating, the mandrel diameter for bend test for adhesion of zinc coating shall be subject to mutual agreement between the purchaser and the manufacturer.

Amend No.2 to IS 277 : 2003

[Page 2, *clause* 8.1, *last sentence (see also Amendment No.1)]* - Substitute the following for the existing:

·However, bend test shall not be carried out on sheets intended for corrugation.'

(Page 4, *clause* 14.1.2) - Substitute the following informal table for the existing:

Grade	*Depth of Corrugations* mm	*Pitch of Corrugation* mm
A	17.5	75
B	12.5	75
C	19.0	70
D	17.5	70

NOTE-On agreement between the purchaser and the manufacturer sheets of other profile, depth and pitch of corrugation may also be supplied subject to required condition for imposed load on roofs as per 4.2 of IS 875 (Part 2) : 1987

(Page 4, *clause 14.1.3, first.sententence)* - Substitute the following for the existing:

'The number of corrugations shall be as per the table given below, depending on the width of the sheet.

(Page 4, *Table* 5) - Substitute the following table given on page 3 for the existing:

Table 5 Overall Widths and Corrugations of Sheets
(Clause 14.1.3)

SINo.	No. of (Corrugation)	Grade	Overall Width of Sheet (mm)	
			Before Corrugation	After Corrugation
(I)	(2)	(3)	(4)	(5)
i)	8	A	750	660
ii)	10	A	900	KIO
iii)	II	A	1000	910
iv)	13	"A	1200	1110
v)	14	A	1220	I 125
vi)	16	A	1350	1220
vii)	18	A	1500	1370
viii)	20	A	1650	1520
ix)	8	B	750	680
x)	10	B	900	830
xi)	11	B	1000	930
xii)	13	B	1200	I 130
xiii)	16	B	J 350	J 240
xiv)	18	B	1500	1390
xv)	20	B	1650	1540
xvi)	10	C	840	720
xvii)	12	D	1000	875

Reprography Unit, 81S, New Delhi, India

Amendment No.3 FEBRUARY 2009

TO

IS 277: 2003 GALVANIZED STEEL SHEETS (PLAIN AND CORRUGATED) - SPECIFICATION

(Sixth Revision)

(Page 3, *clause* 11.1) - Substitute the following for the existing:

'Galvanized plain sheets, corrugated sheets and coils shall be reasonably flat and free from bare spots, pin holes, tears and other harmful defects. However, imperfections such as rough/non-uniform coating, minor dents, water/passivation marks, etc, may be present at certain portions which are not harmful for intended use.'

AMENDMENT NO.4 JUNE 2011

TO

IS 277: 2003 GAL VANIZED STEEL SHEETS (PLAIN AND CORRUGATED) - SPECIFICATION

(Sixth *Revisio*5.1) - Substitute the following for the existing:

'5.1 The base metal chemistry of plain galvanized sheets and coils shall conform to IS 1079 or IS 513 as the case may be.'

[Page 1, *clause* 6 *(see also Amendments No.1 and* 2)] - Substitute the following for the existing table:

Table 1 Mechanical Properties
(Clause 6)

SI No.	Quality	Yield Stress *R.* MPa	Tensile Strength *R..* MPa	Elongation, Percent *A Min*
(1)	(3)	(4)	(5)	(6) (7)
i)	Ordinary	-	-	- -
ii)	Ordinary-Hard	400,*Min*	-	- -
iii)	Corrugated ordinary	-	-	- -
iv)	Drawing (Lock Forming)	350, *Max*	450, *Max*	24 25 .
v)	Deep drawing	280, *Max*	430, *Max*	26 27
vi)	Extra deep drawing	260, *Max*	430, *Max*	28 . 31
vii)	Interstitial free (Stabilized)	240, *Max*	370, *Max*	34 36

NOTES

1 Elongation values shall be reduced by 4 units for thickness values 0.5 mm and lower and shall be reduced by 2 units for thickness value above 0.5 mm up to 0.7 mm.

2 *Ordering condition* - Steel when ordered to mechanical properties shall, at the time the steel is made available for shipment, satisfy the applicable requirements of above table.

(Page 2, *clause* 8) - Substitute the following for the existing:

Amend No.4 to IS 277 : 2003

8 MECHANICAL PROPERTIES

8.1 Tensile Test

8.1.1 Tensile test shall be carried out only, if specified by the purchaser.

8.1.2 When specified, the tensile *test* shall be carried out in accordance with IS 1608 as applicable, and the values of tensile strength, yield stress and percentage elongation shall conform to the requirements specified in Table 1.

8.1.3 Tensile test values apply to transverse specimen in case of sheet/strips. Transverse test piece shall be taken midway between the centre and the edge of the sheet as-rolled.

8.1.4 The yield strength values apply to the 0.2 percent proof stress, if the yield Strength is not clearly distinctive; otherwise the values apply to lower yield Strength.

8.2 Bend Test

8.2.1 Test *Samples*

Bend test for the purpose of conformity shall be carried out at the rate of one set of 2 samples for every 1 000 plain sheets or part thereof. However, bend test Shall not be applicable to GPH, GC and GCH grades intended for corrugation.

c) One bend test shall be carried out for every coil.

d) For bend test, the test piece shall be 230 mm long and 75 mm to 100mm wide cut across the direction of rolling. - - -

8.2.1.3 Specimens for bend tests shall be free from burrs. Filling or machining to remove burrs is permitted. Cracks of the base metal developing at the edge of the specimen or coarse grain developing at the line of the bend shall be disregarded. -

8.3 Requirements

Samples of galvanized steel sheets selected as described in 8.2.1 shall withstand bending through 1800 around a mandrel having diameter specified in Table 3 without peeling or flaking of zinc coating. Crack or fracture of base metal, except those indicated in 8.2.1.3, shall not be permitted.

(Page4, clause 14.1.3.1)- Substitute the following for the existing

'Sheets of sizes and corrugation patterns other than those specified above may be supplied, if agreed to by the purchaser and manufacturer.

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FOREWORD

Use of steel as an engineering material needs no introduction. Since long wrought steel is produced and subsequently processed through mechanical working in various grades and in basically two forms viz. long and flat products and are subjected to further manufacturing processes for use in construction, manufacturing machinery, transportation and other engineering hardware, components, domestic appliances etc.

Scope: The present manual covers the flat steel products in coated conditions to standard specification viz. IS 277. The product are in various forms viz. as in coils, sheets in straight lengths .Galvanized sheets (IS 277) which are also in supply as plain or corrugated sheets.

This standard was first published in 1951 and subsequently revised in 1962. 1969, 1977.1985 and 1992. While reviewing this standard in the light of experienced gained during these years, the Committee decided to revise the standard. In this revision, following changes have been made:

a) Amendments number I, 2, 3 , 4 & 5 have been incorporated.

b) Table I has been modified, interstitial free grade of base metal has been included.

e) Clause 7.1 has been modified.

f) Clause 2 has been updated.

Galvanized steel sheets covered by this standard are intended to be used for purposes such as paneling, roofing, lock forming etc.

This manual shall serve to provide an out line of the steel technology involved in production process and quality control aspects thereof which are expected to assist in objective assessment on operational issues. Further the basics dealt with on certification criteria shall guide in the procedures of supervision over the operation of the licenses. These may also help in effective interaction with plant personnel and as such shall bring uniformity in certification practices all over the country as are carried out by various Branch and Inspection Offices. Specifications referred to be their latest version as are existing now, it is expected that there may be changes in some of the aspects on the revision of standards as and when they take place.

THIS DOCUMENT IS INTENDED FOR INTERNAL USE BY BIS INSPECTING OFFICERS WHO SHOULD HOWEVER DO NOT TREAT SUCH DOCUMENT AS REPLACEMENT FOR REFERRED STANDARDS OR THAT OF RELEVANT SCHEME FOR TESTING AND INSPECTION (STI). STANDARDS AND OTHER DOCUMENTS (STI ETC.) REFERRED ARE AS APPLICABLE AT THE TIME OF PREPARATION OF MANUAL HOWEVER, LATEST STANDARDS/OTHER DOCUMENTS AS IMPLEMENTED SHALL BE REFERRED.

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SECTION I

Product Description – Present manual is meant for Galvanized coils & plain (GP) & corrugated galvanized (GC) sheets. However we should know some basic facts about steel flat products which comprise of strip, sheet and plate. It will be worth while to provide standard definitions of each of them. There are specified maximum thickness to distinguish strip from sheet and minimum specified thickness of the section to distinguish plate from sheet. One aspect, however, stands well defined in strip that it is always supplied in coils & sheets in straight lengths. Strips below 5mm thickness if cut in to straight lengths shall be called sheets where as the strips of 5mm thickness and above if cut in to straight lengths shall be called plates.

Thin strips or sheets produced through repeated cold working get stiffer and of less buckling nature as the yield strength is substantially increased & keep on closer to the tensile strength. Hardness of the surface of such cold worked sheets also increases and tolerances of thickness get closer. In subsequent manufacturing process such sheets or strips are used as raw material where they are required to have higher strength compared to the HR sheets/strips and items manufactured are required to have higher surface hardness, smoother and brighter finish which assist in providing uniform coating all over the surface.

List of referred Indian Standards for raw materials/components and test methods:

IS No.	*Title*
209 ; 1992	Zinc ingot - Specification *(fourth revision)*
513 : 1994	Cold-rolled low carbon steel sheets and strips *(fourth revi...sion]*
1079 : 1994	Hot-rolled carbon steel sheet and strip *(fifth revision)*
1956 (Part 4) : 1975	Glossary of terms relating to iron and steel : Part 4 Steel sheet and strip *(first revision)*
2629 : 1985	Recommended practice for hot dip galvanizing on iron and steel *(first revision)*
6745·: 1972	Method for determination of mass of zinc coating on zinc coated iron and steel acticles
8910 : 1918	General technical delivery require-ments for steel and steel products
13229: 1991	Zinc for galvanizing

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Intended Usage:

Flat products have been in use since long for many common items like roofing, manufacturing tubes for conveying water & gases, pressure vessels including boilers & gas cylinders & for packaging

Galvanized Steel Sheets Plain & Corrugated IS 277	Sheets used for roofing particularly GC Sheets, manufacturing locks, buckets, body of air cooler, Air conditioner & other white goods and packaging

Specifications:-

IS 277:2003 Galvanized steel sheets (plain and corrugated) (*Sixth Revision*)

b) Coated Steel Sheets

Following are the provisions specific to the standards IS 277 under this category.

i) IS 277 – Galvanized steel sheets (plain & corrugated) – Specification with 4 amendments.

a) Zinc to be used for galvanizing shall conform to IS 209:1992 or IS 13229:1991

b) For corrugated sheets the maximum P content may by 0.09%.

c) Bend test shall not be applicable to galvanized corrugated sheets.

d) The recommended grades of zinc coating shall be as under

Thickness mm	**Grade of Zinc coating**	**Thickness mm**	**Grade of zinc coating**
0.18 to 0.28	200 g/m^2	0.63 to 1.0	275 g/m^2
0.30 to 0.55	220 g/m^2	Above 1.0	300 g/m^2

However, the recommended thickness for roofing application is 0.63 and the recommended grade of coating shall be minimum 275 g/m^2. If agreed between manufacturer and purchaser for thickness 0.18 mm to 0.28 mm (both inclusive), other coating grades 180 and 120 may be used.

e) The length, width, thickness of uncoated sheets shall be as specified in clause 13.1 of the specification.

f) Internal nominal dia of sheets supplied in coils shall be 450, 510 or 610mm.

g) Depth of corrugations, number of corrugations in corrugated sheets and width before and after corrugations specified vide clause 14 of the specification.

The base steel shall conform to either IS 1079 or as IS 513 (CR) as per the purchasers requirement

Inspection and testing at various stages of production are necessary to bring the requisite quality characteristics and to evaluate the specified parameters to ensure its conformance to the quality parameters. Entire activity in this context in short is known as quality control and assurance process and starts from the raw material stage.

Where the plants receive raw materials from elsewhere following inspection & testing can be under taken.

. Production of coated sheets – The raw material in such cases is either HR or CR sheets. If they are received as certified to corresponding standards, only sample inspection may be carried out on them and occasional product analysis may be carried out otherwise the plant may have its own inspection system to accept or reject the sheets depending on the surface condition thickness and dimension within or failing in tolerance limits. Mechanical test may also be carried out to established conformance to specified parameters.

The methods of testing of various requirements of sheets/strips of galvanized steel to IS 277 have been provided in the standard itself wherever test method is available as a separate standard the same has been given as under:

Bend test – clause 8 of IS 277 describes the details. This test is required for ductility as well as to determine adherence of zinc coating.

Surface Inspection - The surface of coated sheets is required to be free of defects like lump of zinc and the bare spots in the galvanized sheets. Zinc should not peel off the coated surface.

The galvanized corrugated sheets shall not be subjected to bend test. It specifies the number of samples to be drawn to be 2 for every 1000 plain sheets and the test piece shall be 250 mm long & 75 to 100mm in width and the test piece shall be bent 180^{o} around a mandrel diameter of which shall depend upon the grade of coating & thickness of sheets under testing, the details of diameters shall be as given in Table 3 of the specification. Apart from the test of ductility of base metal the bend test shall indicate about proper adherence of zinc coating as of flaking of zinc coating shall not be permissible.

Coating Test –A set of three samples shall be selected from two corners & middle from a sample sheet and subjected to coating test as per IS 6745 or any other established instrumental method. The specimen size as to be drawn are either $50mm^{2}$ or of 50mm diameter. Beside the above GC & GP sheets are subjected to dimensional & thickness measurement and pitch & depth and number of corrugation against the width of the (GC) sheets.

PREPARED BY : GHBO	APPROVED BY

CHECK-LIST FOR SCRUTINY OF APPLICATIONS AT THE COUNTER
(*to be checked at the time of receipt of Application*)

Sl. No.	REQUIREMENT	YES / NO
1.	Whether the application form is as per BIS standard format and filled completely with no column left as blank?	
2.	Whether the application is signed and stamped?	
3.	Whether the application is accompanied with requisite fee (DD or evidence of transfer through RTGS)?	
4.	Whether the application is accompanied with check list?	
5.	Whether the application is accompanied by all documents as per "the list of documents to be attached"? (***Please see Annex A, Annex A-1, Annex A-2, Annex A-3 and Annex B***)	
6.	In case the application is under "simplified procedure", is the test report attached with application and is not older than one month from date of submission of application?	

Notes:

1. If the application is found to be complete, it shall be recorded and acknowledgement issued to the applicant across the counter.

2. If the application is found to be incomplete or deficient, the deficiencies shall be clearly communicated to the applicant in writing and acknowledgement obtained across the counter.

3. The application shall, then, be marked to the Head of the Branch Office, immediately.

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CHECK-LIST FOR SCRUTINY OF APPLICATIONS BY CONCERNED OFFICER IN THE BO
(*to be checked at the time of receipt of Application*)

Sl. No.	REQUIREMENT	YES / NO
1.	Whether the application is complete in all respects, including the availability of requisite infrastructure for manufacturing and testing as per the Indian Standard? (***Please see Check-list attached as Annex B***)	
2.	Whether the test report(s) attached with the application has / have been submitted within the specified time norms (*applicable in case of simplified procedure*)?	
3.	Whether the test report(s) is / are from BIS or BIS recognized laboratory(ies) only?	
4.	Whether the test report(s) show conformity of the sample(s) tested to the relevant Indian Standard(s)?	
5.	Whether all the requirements as per the relevant Indian Standard(s) have been tested?	
6.	Whether, in case of application under the Foreign Manufacturers' Certification Scheme, additional requirements, as given in **Annex C**, have been checked and found in order?	

Note - After scrutiny of the application, the concerned Officer shall communicate the deficiencies, if any, to the applicant and also indicate the date on which the preliminary / verification inspection is proposed to be carried out, clearly indicating that all deficiencies shall have to be completed by the applicant within the stipulated period in order to enable the BIS officer to verify the same during the preliminary / verification inspection.

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LIST OF DOCUMENTS TO BE ATTACHED WITH APPLICATION

No.	Title of Document	Page
1	Check-list (***Please see Annex B***)	
2	In case the application is filed under "simplified Procedure", the test report(s) in original from BIS or its recognized laboratories for all the requirements of the product and, where applicable, of raw material(s)/ component(s)	
3	Document of Central/State Government (e.g. Registration Certificate, Memorandum of Articles, etc) authenticating the address and purpose of the establishment of the manufacturing unit for which the application is made for grant of licence.	
4	In case the applicant applies as SSI unit, copy of valid Registration Certificate from the Local / State authority or from a Chartered Accountant?	
5	In case the application is signed by the authorized signatory of the applicant, authorization letter from CEO in the name of the authorized signatory.	
6	Process Flow-chart covering all processes of manufacture (from raw material to finished product stage), including details of in-process controls at each stage, even for those stages which have been outsourced?	
7	Complete list of manufacturing machinery, clearly indicating the name of the machinery, the details of the process for which it is used, its capacity and quantity in **Annex A-1**.	
8	In case some of the manufacturing processes are outsourced, provide details of such processes and the controls exercised by you before receipt of such material/components, etc. Also attach an authenticated copy of the agreement.	
9	Complete list of testing facilities, clearly indicating the name of the equipment, the test for which it is used (mention clause No. of the Indian Standard), range / least count / accuracy of the test equipment, calibration status and quantity in **Annex A-2**. **Note:** *Model lists of testing facilities for some of the Indian Standards already covered under product certification are available on the BIS website and may be referred. However, for other Indian Standards, you are advised to study the relevant Indian Standard(s) and / or contact the concerned Branch Office of BIS for guidance*.	
10	Copies of calibration certificates of testing equipment valid at least till 3 months of acceptance of application	
11	Where applicable, 'consent letter' from BIS recognized laboratory (for requirements which have got to be and / or are proposed to be got tested from outside lab for which the applicant does not have in-house test facilities).	
12	Plant Layout clearly indicating location of manufacturing machinery, lab, office, workshop, amenities, storage area, etc., available in the factory premises, with the application?	
13	Appointment letter of QC personnel indicating names, experience, qualifications, date of appointment and also attach a copy each of the qualification certificates	

14	Copy each of the test reports/suppliers' test certificates for each of the raw materials / components.	
15	Copy of in-house or independent test report for the product covering all requirements as per the relevant Indian Standard	
16	In case application is under simplified procedure, an undertaking from the applicant on his letter-head (see **Annex A-3**) that the licence if granted to him shall be put under Stop Marking by BIS if the verification sample(s) drawn during verification visit of the BIS officer prior to grant of licence fail to conform to the Indian Standard. In case the licensee does not take corrective actions, informs BIS and offers two improved lots to BIS for inspection and testing within one month of the date of Stop Marking, the licence shall be processed for cancellation and no further chance would be given to the licensee	

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Section -II

Raw Materials:

Galvanized plain (GP) sheets are manufactured both using HR or wherever application demands of using CR sheets. Corrugated galvanized sheets are manufactured from HR or CR. Galvanized Plain sheets. Tinplates are however invariably manufactured using cold reduced steel strips.

Indian Standards on HR sheet/strip and corresponding CR sheet/strip are IS 1079 & IS 513 respectively. The compositions of four grades viz O, D, DD & EDD of IS 1079 correspond to the identical grades of IS 513 in chemical composition. The mechanical properties of respective grades are higher in case of IS 513 and flatness tolerances are much closer there, in comparison, because of cold rolling. CR sheets have Strain Aging property as after cold rolling the properties of mild steel, particularly the ductility, is affected with time and conditions of temperature in storage. Therefore IS 513 has the specified maximum storage time. Its raw material the sheets to IS 1079, therefore, are required to be in stabilized conditions.

Cold rolled sheets are required to maintain close thickness tolerances however with the the increasing width of the strips the variation in thickness may increase, in order to keep the difference small the specification provides for thickness tolerances for various ranges of widths which include narrow and wide strips. Beside, the strips or sheets are required to be reasonably free from skewness, edge cambering and waviness therefore the specification provides for tolerances in each of the cases of deviations as mentioned. The corrugations in GC sheets have specified width and depth of corrugations in case of sheets to IS 277. The sheets/strips and plates are required to be rolled as rectangular and wide variation in profile would not be permissible subject to tolerances as specified.

SECTION III

Manufacturing Process and Controls

In the present manual the flat products as are being dealt with are of low carbon steel (popularly known as mild steel) grades as are rolled into flats in the form of strips supplied in coil form, sheets supplied in straight lengths and plates supplied either in coils (thinner sections) and in straight length (thicker sections). The definitions of each of the flat sections have already been given in Section I dealing with the product description. The manual is covering three kinds of flat products viz. Hot Rolled (HR) Cold Rolled (CR) and Coated (coating of zinc & tin), the term having been defined earlier and the relevant specifications thereof have been given. The manufacturing process shall be confined to production of steel its casting to slab & then subjecting it to hot rolling to produce coils or producing sheets/plates in HR condition and in case of coated products process of coating and controls.

In case of cold rolling operations, HR Sheets are subjected to cold rolling. They are the raw material for them which is carried out in ambient temperature and are subjected to sub critical or in process annealing at times, to reduce the thickness gradually to desired thickness with closer tolerances.

In case of providing sheets or strips to coating of a metal for corrosion protection the raw material can be either HR or CR Sheets as per the requirements of end applications. They are subjected to hot dip galvanizing to produce sheets or strips to IS 277

Coating of sheets – (Galvanizing)

GP Sheets are manufactured by coating mild steel Sheets by Zinc through hot dip coating process. This process consists of immersing the sheets in a molten bath of Zinc. Zinc is anodic to steel base metal and therefore provides sacrificial protection by corroding preferentially and forming its oxide, Hydroxide or Carbonate in atmosphere and thus provides adequate atmospheric corrosion protection to steel by depositing on the bare spots, scratches or pores on the coated surface exposing the steel. The use of Zinc is largely confined to the protection of steel from the action of corrosive elements of atmosphere and natural water.
The process involves acid pickling, rinsing in water, neutralizing in alkaline medium fluxing

and dipping in molten zinc bath where the necessary control measures are required to be taken to have mass of coating to the desired level and strong adherence of zinc to the base metal. The coating is also required to be uniform without formation of lump or bare spots on the surface. The galvanizing of individual sheets or coating of strips on a continuous basis are carried out in case of the coating of strips. The coils of uncoated sheets are lap welded at the feeding end of the process such that trailing end of the coil under galvanizing welded to the leading and of the fresh coil to maintain continuity. To have spangles lead and antimony in small quantities are added in the bath during coating. Coated sheets are also processed to have silvery finish. By temper rolling extra smooth finish can also be brought about. The mill producing GP sheets may have the machinery to convert them into corrugated (GC) sheets.

The system of quality control on coating in the plants consist of thickness gauge, photo electric cell, pin hole detector, electronic memory etc. which enable in producing of uniformly coated sheets and rejection of sheets having pin holes on the surface or the plates failing in thickness. The Ok Sheets, the sheets with gauge failure and sheets with porosity and pin holes are accumulated in different pliers. Ok sheets are further manually inspected and only the sheets of prime quality (standard grade) are accepted for certification.

Section IV: Certification Criteria

4.0 General

Quality certification under BIS certification marks scheme is a system in which the manufacturer shall produce a material in conformance to a Indian Standard relevant to the product on granting of a license by B.I.S. The producer shall operate the license in line with the relevant Scheme of Testing and Inspection (STI) under the supervision of BIS. Before granting of a license the capability of the plant/mill is to be assessed in respect to its manufacturing machinery, in process quality control, quality assurance facilities suitability of personnel engaged, in respect to their qualification and experience in establishing the quality system and in handling quality assurance activities which will enable them to produce and certify in conformance to the quality parameters as specified. After ensuring that the producer is capable of fulfilling various requirements as expected and after successful testing of samples in independent laboratory, the license is granted and manufacturer is authorized to use standard mark on the product manufactured under the license subject to some other conditions namely acceptance of rate of marking and minimum marking fee as fixed by BIS. There are four major roles to play by BIS in the system

(a) Granting of license
(b) Supervision on the operation of the license
(c) Renewal of license after its operation for a year or any other fixed term.
(d) Investigation on complaints received on certified product and resolving the complaints.

4.1 Identification of Critical Requirements of IS 277:2003

To be decided by committee.

4.2 Scheme of testing and Inspection:

DOC: STI/277/7 June 2004

SCHEME OF TESTING AND INSPECTION
FOR CERTIFICATION OF
GALVANIZED STEEL SHEETS (PLAIN AND CORRUGATED)
ACCORDING TO IS 277:2003 (Sixth Revision)

b) **LABORATORY** – A laboratory shall be maintained which shall be suitably equipped and staffed where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

c) **TEST RECORDS** - All records of tests, inspection and calibration shall be kept in suitable forms approved by the Bureau.

c) All testing apparatus/measuring instruments shall be periodically checked and calibrated and records of such checks/calibration shall be maintained.

d) Copies of any records and other connected papers that may be required by the Bureau shall be made available at any time on request.

3. **QUALITY CONTROL** – It is recommended that, as far as possible, Statistical Quality Control (SQC) methods may be used for controlling the quality of the product during production as envisaged in this Scheme [See IS 397(Part I):1972, IS 397(Part 2):1985 and IS 397(Part 3):1980].

3.1 In addition, effort should be made to gradually introduce a Quality Management System in accordance with IS/ISO 9000 series as appropriate to the activities of the organization.

4. **STANDARD MARK** – The Standard Mark, as given in Column (1) of the First Schedule of the licence, is specified for galvanized steel sheets (plain and Corrugated) specified in IS 277:2003. The grade of coating shall be mentioned in the test certificate (See Annexure I).

c) TEST CERTIFICATE – For each consignment of BIS Certified material conforming to IS 277:2003 there shall be a test certificate which shall contain the Standard Mark, the cast numbers, type of sheets, grade of coating and the corresponding test results (as given in Annexure I).

d) **OTHER MARKING** -

The following markings shall legibly be marked on top of each sheet or on a tag attached to each bundle. In case of coils, the marking shall be done on tag attached to each coil or on the body of the coil)

ii) Manufacture's name or trade mark,
iii) Grade of coating
iv) Length
v) Width
vi) Thickness
vii) Number of corrugations and grade (in case of corrugated sheets)
viii) Material identification (grade, quality etc.) and;
ix) Licence number (CM/L…….).

BUREAU OF INDIAN STANDARDS	**PRODUCT MANUAL FOR CERTIFICATION OF GALVANIZEDSTEEL (PLAIN AND ORRUGATED) AS PER IS 277:2003**
PREPARED BY : GHBO	**APPROVED BY**

5. **LEVELS OF CONTROL** - The tests, as indicated in Table 1 attached and at the levels of control specified therein, shall be carried out on the whole production of the factory which is covered by this scheme and appropriate records and charts maintained in accordance with paragraph 2.0 above. All the production which conforms to the Indian Standards and covered by the licence shall be marked with certification mark of the Bureau.

5.1 In respect of all other clauses of the specification the factory will maintain appropriate control and checks to ensure that their product conforms to the various requirements of this specification.

6.0 **REJECTIONS** – A separate record shall be maintained giving information relating to the rejection of the production not conforming to the requirements of the specification and the method of its disposal. Such material shall in no circumstances be stored together with that conforming to the specification.

7.0 **SAMPLES** – The licensee shall supply, free of charge, the samples required in accordance with the Bureau of Indian Standards (Certification) Regulations, 1988, as subsequently amended, from the factory or godowns. The Bureau shall pay for the samples taken by it from the open market.

e) **REPLACEMENT** – Whenever a complaint is received soon after the goods with Standard Marks have been purchased and used, and if there is adequate evidence that the goods have not been misused, defective goods or their components are replaced or repaired free of cost by the licensee in case the complaint is proved to be genuine and the warranty period (where applicable) has not expired. The final authority to judge the conformity of the product to the Indian Standard shall be with the Bureau.

f) In the event of any damages caused by the goods bearing the Standard Mark, or claim being filed by the consumers against BIS Standard Mark and not “conforming to” the relevant Indian Standard, entire liability arising out of such non conforming product shall be of licensee and BIS shall not in any way be responsible in such cases.

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9.0 **STOP MARKING** – The marking of the product shall be stopped under intimation to the Bureau if, at any time, there is some difficulty in maintaining the conformity of their product to the specification, or the testing equipment goes out of order. The marking may be resumed as soon as the defects are removed under intimation to Bureau.

10.0 The marking of the product shall be stopped immediately if directed to do so by Bureau for any reason. The marking may then be resumed only after permission by the Bureau. The information regarding resumption of markings shall also be sent to the Bureau.

h) **PRODUCTION DATA** – The licensee shall send to BIS as per the enclosed proforma-1 to be authenticated by a Chartered Accountant or by the manufacturer by giving an affidavit/undertaking, a statement of quantity produced, marked and exported by him and the trade value thereof at the end of each operative year of the licence.

Table 1……

BUREAU OF INDIAN STANDARDS	PRODUCT MANUAL FOR CERTIFICATION OF GALVANIZEDSTEEL (PLAIN AND ORRUGATED) AS PER IS 277:2003
PREPARED BY : GHBO	APPROVED BY

DOC:STI/277/7
June 2004

IS 277:2003
GALVANIZED STEEL SHEETS (PLAIN AND CORRUGATED)
TABLE 1 LEVELS OF CONTROL
(Para 5 of the Scheme of Testing and Inspection)

TEST DETAILS				LEVELS OF CONTROL			
Cl.	**Requirement**	**Test Methods**		**No. of samples**	**Lot Size**	**Frequency**	**Remarks**
		Clause	**Reference**				
5.	Raw Material i) Steel coil	5.1 & 5.1.2	IS 277:2003	1	One coil	Each coil	If the material is BIS certified no further testing is required. Otherwise complete testing both physical and chemical as per relevant specification.
ii)	Zinc ingots	5.2	-do- IS 209 or IS 13229	1	One consignment	Each consignment	In case material is received with test certificate of the supplier's own lab or test certificate from a NABL accredited lab indicating its conformity to relevant specification no further testing is required.
11	Freedom from defects	11.1 & 11.2	IS 277:2003	5	500 sheets or part there of or one coil	Each lot or each coil	
12	Mass	12.1 12.2 & Table 4,	-do-	5	500 sheets or part there of	-do-	

				or one coil		
13	Dimensions & Tolerances	13 & 14 -do- Table 5 & 6	5	-do-		
8	Bend Test	8.1 & 8.2 -do- Table 3	2	500 sheets or part thereof or one coil.	-do-	In case of failure of any sample, retests shall be carried out as per cl. 10.1 & 10.2 of Is 277:2003.
9.	Coating Test	9.1 & 9.2 -do- Table 3 IS 6745	3	-do-	-do-	-do-

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BIS STANDARD MARK

ANNEXURE -I
(Para 3.1 of the Scheme of Testing and Inspection)
XYZ - IRON AND STEEL COMPANY (Registered Office Address and works address)

TEST CERTIFICATE FOR GALVANIZED STEEL SHEETS (PLAIN AND CORRUGATED)

TEST CERTIFICATE NO. _____ DATE _____

To M/s
_____

It is certified that the material described below fully conforms to IS 277:2003. Chemical composition and mechanical properties of the product, as tested in accordance with the Scheme of Testing and Inspection contained in the BIS Certification Marks Licence No.CM/L _____ are as indicated below against each order no.

{PLEASE REFER TO IS IS 277:2003 FOR DETAILS OF SPECIFICATION REQUIREMENTS}

TEST RESULTS

Order No.& Date	Size	Lot/Coil No.	Type & designation of sheets	Quantity (tonnes)	Bend Test	Coating Test	Grade of Coating	Remarks

The material supplied conforms to the specified dimensions and tolerances.

REMARKS
SHIPPING ADVICE NO.

SIGNATURE:
DESIGNATION:

WAGON NO.
COMPANY
TRUCK NO.

FOR XYZ IRON AND STEEL

(It is suggested that size A-4 paper (210x297 mm) be used for this Test

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Certificate)

PERFORMA - 1
PROFORMA FOR OBTAINING QUARTERLY PRODUCTION DETAILS

Period covered *

Name of Licensee

CM/L No.

Name of Articles (s) **IS No.** **Grade/Type/Size**

1.1 Brand/Trade/Name(s) of BIS Certification Marked Products

1 Total production of the articles(s) licensed for certification marking

2.1 Total production of the article(s) conforming to Indian Standard

1 Production covered with BIS Certification Mark and its value

a) Quantity (tonne)

b) Invoice sale price

3.1 Brand Name used on production covered under BIS Certification Mark

3.2 Calculation of marking fee as per agreed Rate of Marking Fee

a) Unit

b) Quantity covered with BIS Certification Mark

***Information to be filled up by BO before forwarding to the licensee.**

Note : Incase a clause is not applicable, suitable remarks may be given against it.

c) Marking fee rounded off in whole rupees as obtained by applying unit rates given in (a) on quantity given in (b)

4. Quantity not covered with BIS Certification Mark. If any, and the reasons for such non-coverage

4.1 Brand Name under with non certified goods were sold

5.0 Quantity Exported with BIS Standard Mark and its value

5.1 Brand Name under which BIS Certified goods are exported

6.0 Authentication by Chartered Accountant or by the manufacturer By giving an affidavit/undertaking

Signature of Authorised Signatory
Name
Date

4.3 Marking Fee rates

Unit=1Tonne

Rs.3.00 per unit for all quantity with minimum marking fee Rs.29000.00 for SS & Rs. 34000.00 for LS

4.4 Grouping Guidelines if any

BUREAU OF INDIAN STANDARD
(Central Marks Department-III)

. Ref: CMD-III/16: 277 07.02.2011

Subject: Grouping Guidelines for Galvanized Steel Sheets (plain and Corrugated) as per IS 277, for drawl of examples for considering inclusion / Grant of Licence

This has reference to grouping guidelines proposed by FDO vide Note No. FDO/IS 277 dated
08092010. Proposed guidelines were circulated to all ROs/BOs/IOs vide CMD Note of even No. dated 14012011. No comments received.

Based on the proposal provided by FDO, the following grouping guidelines may be considered:

1) From each Classification of Grades of Galvanized Corrugated. Sheets, one sample of highest thickness and highest mass/grade of coating shall be drawn for testing for covering the entire range of thickness and mass/grade of coating of Galvanized Corrugated Sheets, offered for inspection.

2) From each Classification of Grades of Plain Galvanized Steel Sheet and Strip (coils), one sample of highest thickness and highest mass/grade of coating, shall be drawn for testing for covering the entire range of thickness and mass/grade of coating of Plain Galvanized Steel Sheet and Strip (coils), offered for inspection.

d) In order to cover Galvanized Corrugated Sheets as well as Plain Galvanized Steel Sheet and Strip (coils) in the licence, one sample from Plain Galvanized Steel Sheet and Stripe coils) shall be drawn for bend testing only, in addition to 1) above.

e) It shall be ensured that manufacturer is having complete manufacturing and testing arrangements required for range of product to be covered in the licence. During operation of Licence, sample by rotation shall be drawn for various Classification of Grades covered in the licence.

5) For inclusion of additional classification of grades in the existing licence, samples shall be drawn from additional grades, following the same procedure as mentioned above, for grant of licence.

6) This is issued with the approval of Competent Authority.

4.5 Guidelines for writing scope of licence

Scope of licence will be based on manufacturing and testing capability of the manufacturer and sample(s) offered during preliminary inspection based on grade of coating and thickness of sheet/coil of GP/GC sheet.

4.6 Guidelines for inclusion of new variety:

Please refer sl No.4.4.

4.7 Sample size including guideline for drawl of separate samples when samples are required to be sent to different Labs.

One sheet of GP/GC preferably of highest thickness and highest grade of coating.

4.8 Manner of sealing sample(s):

Tags having information about batch no. of sample, code no and signature of inspecting officer may be sealed by BIS Brass seal using sealing wax.

4.9 Remnants of sample are non returnable and to be kept in Lab for a fixed period (generally kept for 3 months) and then to be scraped.

4.10 A separate record shall be maintained giving information relating to the rejection of the production not conforming to the requirements of the specification and the method of its disposal. Such material shall in no case be stored together with that conforming to the specification.
4.11 Market Sample is to be drawn for this product.

Section V: Inspection and Testing

5.0 Packing Material requirement for dispatch of sample(s)

Hessian Cloth/Polythene film (bubble plastic film)

5.1 List of Test Equipment /Facilities with requirement and frequency of calibration

To be provided by CL.

5.2 Status of test facilities in BIS Labs and OSLs with Testing Charges and approximate time required for testing by BIS labs/OSLs:

These data are available on intranet.

5.3 Grant of Licence will be based on on independent testing basis. Details of Tests to be carried out in the Factory in case of:

Applicant samples/ Verification Sample/Surveillance: During Preliminary/Surveillance Inspection possible tests in one day may be carried out to assess the competency of Lab/QC personnel and accuracy/workability of test equipments.

Chemical analysis of steel sheet may be carried out as IS 513/IS 1079.

5.4 Ideal qualification for BIS inspecting officer for this is Metallurgical Engineer or Mechanical Engineer.