
रेजर ब्लेड के लिए अतप्त-बेल्लित स्टेनलेस
इस्पात — विशिष्टि
(पहला पुनरीक्षण)

**Cold-Rolled Stainless Steel Strips for
Razor Blades — Specification**
(*First Revision*)

ICS 77.140.50

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भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Alloy Steels and Forgings Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1979. This revision has been brought out to bring the standard in the latest style and format of the Indian Standards. It also incorporates two amendments issued to the last version of the standard.

In addition, the following significant changes have been made:

- a) Clause **4** on supply of materials has been modified;
- b) Recommended load for hardness testing and specified value of hardness has been modified in **8**;
- c) Requirements of carbide testing has been modified in **9.2**;
- d) Clause **10** on sampling has been added;
- e) Dimensions and tolerances requirements have been modified in **13**; and
- f) Clause **14** on surface finish has been modified.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard***COLD-ROLLED STAINLESS STEEL STRIPS FOR RAZOR
BLADES — SPECIFICATION***(First Revision)***1 SCOPE**

This standard covers the requirements for cold-rolled stainless steel strips for the manufacture of razor blades.

2 REFERENCES

The standards given below contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards:

<i>IS No.</i>	<i>Title</i>
IS 228	Methods for chemical analysis of steel (issued in various parts)
IS 1501 (Part 1) : 2020/ISO 6507-1 : 2018	Metallic materials — Vickers hardness test: Part 1 Test method (<i>fifth revision</i>)
IS 1762 (Part 1) : 1974	Code for designation of steels: Part 1 Based on letter symbols (<i>first revision</i>)
IS 1956 (Part 4) : 2013	Glossary of terms relating to iron and steel: Part 4 Flat products (<i>second revision</i>)
IS 8910 : 2022/ ISO 404 : 2013	Steel and steel products — General technical delivery requirements (<i>second revision</i>)
IS 15262 : 2002/ ISO 4287 : 1997	Geometrical product specifications (GPS) — Surface texture: profile method — Terms, definitions and surface texture parameters

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 1956 (Part 4) shall apply.

4 SUPPLY OF MATERIAL

4.1 General requirements relating to the supply of material shall be in accordance with IS 8910.

4.2 Steels covered by the standard shall be ordered and delivered on the basis of the following:

- a) Chemical composition, carbide density and hardness in the as-rolled condition; and
- b) Chemical composition, carbide density, hardness in the as-rolled condition and mechanical properties as agreed to between the purchaser and the supplier.

4.3 Information to be given by the Purchaser

While placing an order for the purchase of material covered by this standard, the purchaser should specify the following:

- a) Designation;
- b) Form (strip);
- c) Quantity (mass);
- d) Nominal dimensions – thickness and width;
- e) Condition (as-rolled);
- f) Test and test reports;
- g) Any other special requirements; and
- h) Specific marking and packing requirements, if any.

5 MANUFACTURE

Unless otherwise agreed in order, the processes used in making the steel and the product are left to the discretion of the manufacturer. When so desired, the purchaser shall be informed of the steel making process.

6 FREEDOM FROM DEFECTS

The material shall be of uniform quality consistent with the good manufacturing and inspection practices. The steel shall not have defects of a nature or degree that will be detrimental to the intended end use.

7 CHEMICAL COMPOSITION

7.1 Ladle Analysis

The ladle analysis of steel shall conform to the values given below:

<i>Grade</i>	<i>Constituent</i>	<i>Percent</i>
(1)	(2)	(3)
X66Cr13	Carbon	0.60 to 0.72
	Manganese	0.40 to 1.0
	Silicon	0.50 <i>Max</i>
	Sulphur	0.030 <i>Max</i>
	Phosphorus	0.040 <i>Max</i>
	Chromium	12.0 to 14.0

7.2 Product Analysis

The permissible variation in the case of product analysis from the limits specified in 7.1 shall be as given below:

<i>Sl No.</i>	<i>Constituent</i>	<i>Variation Over the Specified Maximum or Under the Minimum Limits, %</i>
(1)	(2)	(3)
i)	Carbon	0.03
ii)	Manganese	0.04
iii)	Silicon	0.05
iv)	Sulphur	0.005
v)	Phosphorus	0.005
vi)	Chromium	0.15

NOTE — Variations shall not be applicable both over and under the specified limits in several determinations in a heat.

7.3 Residue Elements

The following elements shall not be intentionally added to the steel and shall not exceed the following limits:

<i>Sl No.</i>	<i>Constituent</i>	<i>Percent</i>
(1)	(2)	(3)
i)	Nickel	0.50 <i>Max</i>
ii)	Molybdenum	0.50 <i>Max</i>
iii)	Copper	0.35 <i>Max</i>

7.4 The chemical composition may be tested as per the procedure mentioned in IS 228 or any other established instrumental/chemical method. However, in case of dispute the procedure given in IS 228 and its relevant parts shall be the referee method.

8 HARDNESS TEST

8.1 The hardness testing shall be carried out as per IS 1501 (Part 1). The recommended load for the hardness test is 200 g to 1 000 g and the load shall be chosen as high as possible, avoiding however, any form of deformation on the reverse side of the strip.

8.2 For material supplied in as-rolled condition, the hardness of cold-rolled steel strip shall be in the range 250 HV to 350 HV.

9 MICROSTRUCTURE

9.1 Microstructure of steel strip in the supplied condition when examined shall have spheroidized finely dispersed alloy carbides in a matrix of ferrite.

9.2 Carbide Density

The carbide density shall be a minimum of 40 per 100 μm^2 at a magnification of 1 000 X.

10 SAMPLING

10.1 For the purpose of this standard, products belonging to the same cast, same heat treatment and same delivery condition shall constitute a lot. Samples shall be tested from each lot.

10.2 The ladle analysis shall be supplied by the producer. If a product analysis is required by the purchaser at least one sample of product shall be taken from each heat.

10.3 For determination of hardness, microstructure, carbide density one sample per cast per heat treatment batch per thickness shall be taken for the tests.

10.4 For other tests, if any, sampling shall be as agreed to between manufacturer and purchaser.

11 RETEST

Should any of the test pieces selected fail to pass any of the tests specified in this standard, two further samples shall be selected from the same lot for testing in respect of each failure. Should the test pieces from both these additional samples pass, the material represented by the test samples shall be deemed to comply with the requirements of that particular test. Should the test pieces from either of these additional samples fail, the material represented by the test samples shall be deemed as not conforming to this standard.

12 EDGE CONDITION

Cold-rolled steel strip shall have slit edges reasonably free from burrs.

13 DIMENSIONS AND TOLERANCES

13.1 The cold rolled strips shall be supplied in widths up to 25 mm and thickness 0.05 mm to 0.15 mm. The tolerances on width and thickness of cold-rolled strips shall be as follows:

Width : $\leq 25 \text{ mm} \pm 0.03 \text{ mm}$

Thickness t : $0.10 \text{ mm} < t \leq 0.15 \text{ mm} \pm 0.007 \text{ mm}$

$0.05 \text{ mm} \leq t \leq 0.10 \text{ mm} \pm 0.005 \text{ mm}$

13.2 Camber

13.2.1 The transverse variation of thickness shall not exceed 0.005 mm.

13.2.2 *Edge Camber (Straightness)*

There shall be no lateral bends or edge camber of greater magnitude than 4/1 200 mm for width over 10 mm and 6.35/1 200 mm for width of 10 mm or less.

13.2.3 *Edge Ripple*

Only slight amount of edge ripple may be present. If required, permissible limits may be as agreed to between the manufacturer and the purchaser.

14 SURFACE FINISH

14.1 The cold-rolled material may be further subjected to cold rolling on special rolls or polishing to obtain various finishes termed as standard-fine, semi-matte, dull or bright as per customer requirement.

14.2 The material can be supplied in any surface finish as agreed to between manufacturer and the purchaser.

14.3 Surface roughness shall be $R_a \leq 0.15 \mu\text{m}$

where

R_a is the average roughness when determined in accordance with IS 15262. Restricted range of surface roughness can be agreed to between the manufacturer and the purchaser.

15 PACKING

Cold-rolled steel strip coils shall be suitably packed to prevent them from rusting and damage during transit. As a special case against rust, suitable preventives may be applied on the coil before packing, if the purchaser demands.

16 MARKING

16.1 Every coil of strip shall be legibly marked with:

- a) Name or trade-mark of the manufacturer;
- b) Size; and
- c) Cast number or any other identification mark by which coil may be traced to the cast from which it was made.

16.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Alloy Steels and Forgings Sectional Committee, MTD 16

<i>Organization</i>	<i>Representative(s)</i>
Mishra Dhatu Nigam Limited, Hyderabad	SHRI T. MUTHUKUMAR (Chairperson)
All Indian Stainless Steel Industries Association, Mumbai	SHRI HITENDERA BHALARIA SHRI JAY KUMAR BANSAL (<i>Alternate</i>)
Atomic Mineral Division, Nagpur/New Delhi	DR SMEER DURANI SHRI ALOK PANDEY (<i>Alternate</i>)
BEML Ltd, Kolar	SHRI B. H. MADHUSUDHAN SHRI RAVEENDRA (<i>Alternate</i>)
Bharat Forge Limited, Pune	SHRI SAGAR BAPAT
Bharat Heavy Electrical Limited, New Delhi	SHRI VENKATESWARLU ALA SHRI MANU SHANKAR HARISH (<i>Alternate</i>)
CSIR National Metallurgical Laboratory, Jamshedpur	DR S. GHOSH CHOWDHURY DR B. RAVI KUMAR (<i>Alternate</i>)
Defence Met. Research Laboratory, Hyderabad	SHRI B. VEERABABU SHRI BIDYAPATI MISHRA (<i>Alternate</i>)
Directorate General Quality Assurance, New Delhi	SHRI L. P. VARTE SHRI M. K. SHRIVASTAV (<i>Alternate</i>)
Hindustan Aeronautical Limited, Bangalore	DR R. R. BHAT SHRI ANIL KUMAR M. (<i>Alternate</i>)
Indian Stainless Steel Development Association, Gurugram	SHRI ROHIT KUMAR SHRI A. K. SHARMA (<i>Alternate</i>)
Indira Gandhi Centre for Atomic Research, Kalpakkam	SHRI UTPAL BOHRA
Jindal Stainless Limited, New Delhi	SHRI BISWABASU ROY CHOWDHURY SHRI NARASIMHA RAO KONISETTI (<i>Alternate</i>)
Larsen & Toubro Limited, Mumbai/New Delhi	SHRI KULDIP GOEL SHRI R. G. KULKARNI (<i>Alternate</i>)
Mahindra Sanyo Special Steel Private Limited, Khopoli	SHRI SACHIN BHAMBURE
Ministry of Commerce and Industry, DPIIT, New Delhi	SHRI S. K. JAIN
Ministry of Steel, New Delhi	SHRI PARMJEET SINGH SHRI BHAGIRATHI PRADHAN (<i>Alternate</i>)
Mishra Dhatu Nigam Limited, Hyderabad	SHRI CHANDAN HALDER DR SAURABH DIXIT (<i>Alternate</i>)
Mukand Ltd, Thane, Kalwe	SHRI M. M. RAOSHRI SUNIL NAIR (<i>Alternate</i>)
National Test House, Kolkata	SHRI A. DAS SHRI YOGESH SINGH (<i>Alternate</i>)
Nuclear Fuel Complex, Hyderabad	SHRI H. R. RAVINDRA SHRI Y. BALAJI RAO (<i>Alternate</i>)
RITES Limited, Gurugram	SHRI SANDEEP GUPTA SHRI V. K. DWIVEDI (<i>Alternate</i>)

<i>Organization</i>	<i>Representative(s)</i>
Schaeffler India Limited, Pune	SHRI ANUSHUMAN GANERIWALA SHRI BISWANATH NANDI (<i>Alternate</i>)
Society of Indian Automobile Manufacturers (SIAM), New Delhi	SHRI KARTIKE KARWAL MS KANISHKA CHANA (<i>Alternate</i>)
Star Wire (India) Limited, Ballabgarh	DR SHIVRAJ SINGH KASANA DR AVNISH KUMAR (<i>Alternate</i>)
Steel Authority of India Limited (SAIL), Research & Development Centre for Iron & Steel, Ranchi	SHRI S. K. JHA SHRI P. KUMAR (<i>Alternate</i>)
SAIL, Visvesvaraya Iron and Steel Plant, Bhadravathi	SHRI RAVI KIRAN UPADYA SHRI KUMAR M. S. (<i>Alternate</i>)
Steel Authority of India Limited, IISCO Steel Plant, Bardhaman	SHRI SAIKAT DE SHRI RAJIB KHANDA (<i>Alternate</i>)
Steel Authority of India Limited (SAIL) — Salem Steel Plant, Salem	SHRI P. GOVINDRAJAN SHRI VIRENDER VEER (<i>Alternate</i>)
Sundram Fasteners Limited, Chennai	SHRI ATUL KUMAR AGARWAL DR P. SHANMUGAM (<i>Alternate</i>)
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Member Secretary

SHRI ARUN PUCCHAKAYALA
SCIENTIST 'D'/JOINT DIRECTOR
(METALLURGICAL ENGINEERING), BIS

Panel for formulation of standard on cold-rolled stainless steel strips for razor blades MTD 16/P15

<i>Organization</i>	<i>Representative(s)</i>
Steel Authority of India Limited (SAIL) - Salem Steel Plant, Salem	SHRI P. GOVINDARAJAN (Convenor)
Jindal Stainless (Hisar) Limited, Hisar	SHRI DEEPAK BANSAL SHRI P. L. PAHWA (<i>Alternate I</i>) SHRI MOHAMMAD ARSHAD (<i>Alternate II</i>)
Procter & Gamble Gillette, Bhiwadi	SHRI SURESH CHAUDHARY
Laser shaving products India Pvt Ltd, Faridabad	SHRI P. M. JOSHI

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones: 2323 0131, 2323 3375, 2323 9402

Website: www.bis.gov.in

Regional Offices:

	Telephones
Central : 601/A, Konnectus Tower -1, 6 th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	{ 2323 7617
Eastern : 8 th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	{ 2367 0012 2320 9474
Northern : Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	{ 265 9930
Southern : C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	{ 2254 1442 2254 1216
Western : Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	{ 2821 8093

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