

REVISION OF SPECIFICATION / STR

Ref: Current Spec. No. C-K201, Amendment-1, Corrigendum-1 Specification for Stainless Steel Sheets/Plates for Coaches of Indian Railways

1. RDSO is reviewing the specification/STR to cater to the latest technological developments in the field, modify clauses not relevant in the present context and making them more enabling with focus on functional requirements.
2. It is requested that your comments / suggestions with regard to improvements / modifications in specification / STR of this item may be submitted in the following format alongwith the justification for the changes required.

Part A: Basic Information

SN	Particulars	Information
1	Name	
2	Designation	
3	Professional Qualification	
4	Organization / Firm's Name	
5	Address for Correspondence	
6	Contact No.	
7	Email ID	
8	<u>In case of Firm / Individual:</u> Manufacturing experience of item (or similar Item) on which comments are offered	
9	<u>Where relevant:</u> Whether any technical document to support suggested changes is available / enclosed for better appreciation	

Part B: Comments / suggestions on the specification

SN	Clause No. of RDSO STR / Spec	Clause, as exists in RDSO STR / Spec	Clause , as it should read after incorporation of comments / suggestions in the RDSO Spec / STR	Justification for changes

Comments may be sent to:

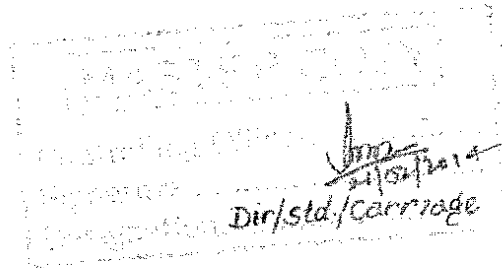
Director/CD/Carriage
Research Designs and Standards Organization
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INDIAN RAILWAYS



सत्यमेव जयते



SPECIFICATION FOR STAINLESS STEEL SHEETS/PLATES FOR COACHES OF INDIAN RAILWAYS

S. No.	Month/Year of Issue	Revision / Amendment	Page No.	Reason for Amendment
1.	January, 2002	-	-	First issue
2.	February, 2014	Amendment No. 1	Clause No. 1.1 of Annexure-1	Nominal thickness of 1.7mm incorporated


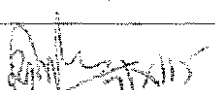
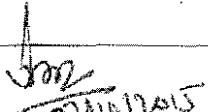
2014-2-01/57 Corrigendum 1

Issued by
Research Design and Standards Organization
Manak Nagar, Lucknow - 226011

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**Corrigendum No.1 of October, 2015 to RDSO Specification No. C-K 201,
Amendment No.-1 for Stainless Steel Sheets /Plates for Coaches
of Indian Railways.**




1. In Table-1 (STEEL GRADES AND THEIR CHEMICAL COMPOSITION AS DETERMINED BY LADLE ANALYSIS), X2 Cr Ni 12 (409M) (IRSM 44) shall be read as X2 Cr Ni 12.
2. In Table-2-(MECHANICAL PROPERTIES OF COLD ROLLED PRODUCTS (6 MM THICKNESS MAXIMUM)), X2 Cr Ni 12 (409M) shall be read as X2 Cr Ni 12.
3. In Table-3 (GUIDELINE INFORMATION ON FILLER METALS FOR ARC WELDING), X2 Cr Ni 12 (409M) (IRSM 44) shall be read as X2 Cr Ni 12.
4. In Table-3 (GUIDELINE INFORMATION ON FILLER METALS FOR ARC WELDING), X2 Cr Ni 12 (409M) shall be read as X2 Cr Ni 12.
5. In Annexure-II, "Laboratory Weld Corrosion Resistance Test For Ferritic Stainless Steel – Electric Arc Welded Samples only (409, 409 M)" shall be read as "Laboratory Weld Corrosion Resistance Test For Ferritic Stainless Steel – Electric Arc Welded Samples only (X2 Cr Ti 12 (409) and X 2 Cr Ni 12)".

Signature	 07/10/2015	 07/10/15	 07/10/2015
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**Amendment No. 1 of February, 2014 to RDSO Specification No. C-K201 for
Stainless Steel Sheets /Plates for Coaches of Indian Railways.**

Table of the clause No. 1.1 of Annexure-1 of the specification to be read as follows:

Nominal thickness (mm)	Permissible thickness deviation (+/-mm)	Upper deviation in the normal width	Upper deviation in normal length.
1 & 1.25mm	0.06	1.5 mm	10 mm
1.7 & 2.00 mm	0.075	2 mm	10 mm
2.50 & 3 mm	0.10	2 mm	10 mm
4.00 mm	0.13	2 mm	10 mm
5 & 6 MM	0.20	5 mm	15 mm

Signature			
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MASTER COPY

C-K201

Controlling Officer

James

Signature

Designation

#DSC/SS

**SPECIFICATION FOR STAINLESS STEEL
SHEETS / PLATES FOR COACHES
OF INDIAN RAILWAYS**

JANUARY, 2002

ISSUED BY

**RESEARCH DESIGNS AND STANDARDS ORGANISATION
MINISTRY OF RAILWAYS
MANAK NAGAR
LUCKNOW - 226011**

Price :

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SPECIFICATION FOR STAINLESS STEEL SHEETS/PLATES FOR COACHES OF INDIAN RAILWAYS

1. FOREWORD

This specification has been adopted for stainless steel sheets/plates to be used in the manufacture of passenger coaches. These are expected to provide desired mechanical properties and formability, ease of fabrication, adequate corrosion resistance against varying temperature, humidity and exposure to environmental conditions experienced during service and, therefore, required to be produced through established manufacturing process and quality assurance procedures.

This specification is issued under the fixed serial number IRS M-XXX-2001, the final number indicating the year of original adoption as specification or the year of last revision. This specification also draws reference to other specifications, wherever applicable.

2. SCOPE

This specification specifies the technical requirements and conditions of supply for the stainless steel sheets/plates having nominal thickness varying from 1.00 mm to 6.0 mm. The sheets/plates shall be supplied in width of 1250 mm max. in cut to length or in continuous coil form in trimmed conditions, unless otherwise specified in the order.

3. MANUFACTURE

Steel shall be produced in Electric furnace and refined by AOD/VOD secondary refining process to ensure freedom from harmful gases, inclusions and other undesirable constituents. Any other process adopted shall have the prior approval of the Purchaser.

4. FREEDOM FROM DEFECTS

Steel sheets/plates shall be cleanly rolled to the dimensions, weights and tolerances specified. Finished product shall be free from cracks, surface flaws, laminations, rough, jagged and imperfect edges, unevenness and other harmful defects detrimental to the end use. The sheets/plates shall be reasonably flat, cleanly sheared and truly squared to the specified dimensions. The Inspecting Officer or the Purchaser's representative shall be free to decide the method of detecting these defects.(The defects, its classification and detection method will be included in the approved QAP to be finalised at the time of order)

5. CONDITIONS OF SUPPLY

The material supplied shall be of guaranteed mechanical properties, formability, weldability and corrosion resistance.

While ordering, the specification designation, shall include material grade, designation, heat treatment condition, work hardening category, surface quality, surface treatment, etc. Unless otherwise specified, the austenitic stainless steel shall be supplied in solution annealed and descaled condition while ferritic stainless steel shall be supplied in annealed and descaled condition.

Optionally, only for specific areas of usage where surface protection is important, cold rolled sheets/coils may be procured with LDPE tape used as surface protection film(90 ± 10 microns).

The steel sheets/plates shall be manufactured, by hot rolling and subsequent cold rolling process, according to the requirements specified and shall be to the specified dimensions.

6 CHEMICAL COMPOSITION

6.1 Ladle Analysis

The ladle analysis of steel when carried out by the methods specified in IS:228/ASTM or by any other instrumental/chemical method approved by the Purchaser shall be as indicated in Table -1. In case of dispute, the method specified by the Purchaser shall be the reference method.

6.2 Product Analysis

Analysis of product composition from each cast shall be carried out by methods specified in IS:228/ASTM and the chemical variation from the ladle analysis shall be within the limits of permissible variation indicated in Table - 1a.

7 MECHANICAL PROPERTIES

7.1 Tensile Test

- 7.11 Tensile test shall be carried out from each lot of 15 tonnes coil weight or part thereof belonging to the same cast.
- 7.12 Where sheets/plates or more than one thickness are rolled from the same cast, one tensile test shall be carried out from the material representing each thickness.
- 7.13 Tensile test shall be carried out both in longitudinal and transverse direction of rolling.
- 7.14 When tested in accordance with method of tensile testing specified in ASTM A240/370, the UTS, 0.2 % proof stress, and elongation percentage at fracture shall be according to stipulation in Table - 2.
- 7.15 If the fracture of the tensile test piece is outside the gauge length, the test shall be discarded and retest conducted. To facilitate this, sufficient numbers of test pieces shall be prepared in advance.

7.2 Bend Test

- 7.2.1 Bend test shall be conducted from each lot of 15 tonnes of coil weight or part thereof of the same cast.
- 7.2.2 One test piece each shall be selected in longitudinal and transverse direction of rolling.
- 7.2.3 The rough edges or burrs arising from shearing may be removed by filing or grinding and machining. No other preparation shall be received by the test pieces.
- 7.2.4 Bend test shall be conducted in accordance with the method specified in ASTM A 370.
- 7.2.5 The bend test specimens shall withstand being bent at ambient temperature in any direction through 180° around a mandrel or former of diameter equal to the material thickness without cracking on the outside convex surface of the bent portion.

8. LOCATION OF TEST PIECES

Samples for chemical analysis and test pieces for tensile and bend test shall be selected from the product so as to be representative of the lots.

9. RETEST

Should any of the test pieces first selected not pass any of the tests specified in this specification, two further samples shall be selected from the same lot in the same manner. 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 not pass, the material represented by the test samples shall be deemed to be not conforming to this specification.

10. DIMENSIONAL TOLERANCES

Stainless steel sheets/plates shall be supplied to dimensions ordered. Permissible variation from size ordered have been listed in Annexure - 1.

11. SURFACE FINISH

11.1 The sheets/plates supplied shall be well and cleanly rolled. Minor surface defects may be removed by grinding, provided the thickness is not reduced locally by more than 4% and the final thickness remains within the tolerance.

11.2 The surface finish(Ra Value) of the products shall not exceed 1.6 microns upto and including 2 mm thickness and 8 microns for thickness above 2 mm upto and including 6 mm.

12. WELDABILITY

The sheets/plates in 2D & 2B finishes shall be suitable for metal arc welding using appropriate electrodes approved by RDSO or electrodes recommended by the Manufacturer. When butt welded with these electrodes, the weld and adjacent area shall not show any sign of cracking on macro examination (5X). Guidelines in respect of filler metals of arc welding is indicated in Table - 3.(Butt weld test shall be conducted for every 100 MT or part there of in each thickness and grade). 3 specimens of 30 mm minimum width will be cut from the welded samples(100 to 150 mm each side) and ground flush on both sides for macro examination. If 2 out of 3 specimen pass, the lot is acceptable. In case all three specimens fail, the test will be repeated where if all 3 pass the lot is acceptable.

13. CORROSION RESISTANCE

The austenitic stainless steel sheet/coil/plate covered in this specification shall be subjected to corrosion resistance test in

accordance with IS:10461 Part 2/ASTM A 262 Practice E for resistance against intergranular and intercrystalline corrosion and the results shall comply to Table -4.

- 13.1 The austentic and ferritic stainless steel butt welded samples(as in para 12) will be subjected to corrosion resistance tests as in Annexure -2.

14. **INSPECTION**

- 14.1 The purchaser or his Inspecting Officer shall have free access to the works of the Manufacturer at all reasonable times and he shall be at liberty to inspect the manufacture at any stage and to reject material that does not conform to the stipulations of this specification.

14.2 Testing facilities.

- 14.2.1.1 The Manufacturer shall supply the material required for testing free of charge and shall, at his own cost, furnish and prepare the necessary test pieces and supply labour and appliances for such testing as may be carried out on his premises in accordance with this specification. Failing to provide the facilities at his own works for making the prescribed test, the Manufacturer shall bear the cost of carrying out the tests in a laboratory/test house selected by the Inspecting Officer or the Purchaser.

- 14.2.2 All supplies of plate/sheet shall be furnished with a test certificate indicating chemical composition, mechanical properties, bend test, and corrosion tests results.

15. **MARKING**

Each product (Sheet/plate) shall be continuously marked with material specification, code of surface finish, cast number, the Manufacturer's name or trade mark and size of the product.

16. PROTECTION AND PACKING

- 16.1 Plates supplied shall be provided with reasonable packing, with metal strapping for handling during transit and storage.
- 16.2 Due care shall also be taken, to avoid mechanical damage and corrosion during transit.

17. HEAT TREATMENT

Stainless steel sheets covered in this specification shall be supplied in one of the heat treatment conditions mentioned in the order. Various heat treatment conditions for the sheets/plates are indicated in Table -5.

TOLERANCES FOR STAINLESS STEEL SHEETS/PLATES

1.0 PERMISSIBLE DEVIATIONS :

1.1 Standard size of cut sheet/plate will be 1250 mm width max. Permissible deviation of thickness, width and length shall be as per the table given below for various nominal thicknesses.

Nominal thickness(mm)	Permissible thickness deviation(+/- mm)	Upper deviation in the normal width	Upper deviation in normal length
1 & 1.25 mm	0.06	1.5 mm	10 mm
2.00 mm	0.075	2 mm	10 mm
2.50 & 3 mm	0.10	2 mm	10 mm
4.00 mm	0.13	2 mm	10 mm
5 & 6 mm	0.20	5 mm	15 mm

1.2 The maximum permissible deviation of straightness of the length edge (camber) is 5 mm on a length of 2500 mm.

1.3 The maximum permissible deviation of flatness is 12.7 mm in a length of 2500 mm.

1.4 The maximum permissible deviation of squareness is 1% of the sheet width.

2 Measurement of Parameters :

2.1 Thickness is to be checked on any point along the length of the sheet/plate at a distance of 20 mm from the edge.

ANNEXURE - 2

Laboratory Weld Corrosion Resistance Test For Ferritic Stainless Steel - Electric Arc Welded Samples only (409, 409M)

- 1.0 One sample from each ordered quantity lot of 100MT or part there of in each thickness and grade is subjected to testing in a boiling mixture of 50% reagent grade hydrochloric acid and 50% water. Prepare the Hydrochloric acid solution by slowly adding reagent grade (approx. 37%) hydrochloric acid to an equal volume of distilled water.
- 2.0 Approximately 40-65mm long samples (3 numbers) in the direction of rolling with weld in centre across the direction of rolling and of 25 mm width shall be prepared from the welds. The sample may be one piece, which contains the weld and part of base metal to one side / both side of the weld. Alternatively, the sample may be two separate pieces with one containing the weld and a similar size section from the base metal. Remove all burrs and sharp edges by lightly grinding. Remove dust and grease by cleaning with soap and water or other suitable solvents. Then, place samples in the flask. It is not recommended to test more than four samples together, or to mix alloy types.

The test container shall be 1L Erlenmeyer flask equipped with ground glass joints and an Allihn condenser. The volume of solution shall be approx. 700 ML.

- 3.0 Measure the thickness of the sample at five locations along the weld area and at five locations along the base-metal section. In both cases, take measurements at approximately equal intervals along the section lengths. Make these measurements with a sharp pointed micrometer having a least count of 0.01 mm.
- 4.0 Immerse the samples into the solution. Add boiling chips and bring to a boil. Allow the chips to remain boiling throughout the test. The time of testing shall be 45 minutes.
- 5.0 At the end of the test period, remove the samples from the solution, rinse with distilled water, and dry.
- 6.0 After exposure to the test solution, repeat the thickness measurement as in 3.0. If the thinning is not uniform across the width of the weld, then two sets of weld -metal measurement are required. One set of measurements is to be taken along the centerline of the weld. The second set of measurements is to be taken in the thinnest area of the weld.
- 7.0 Calculate the corrosion ratio, R, for both sections of the weld as follows :

$$R = \frac{W_o - W}{B_o - B}$$

Where :

W_o = Average weld-metal thickness before the test

W = Average weld-metal thickness after the test

B_o = Average base-metal thickness before the test.

B = Average base-metal thickness after the test.

8.0 An average corrosion ratio of 3 samples shall be 1.25 or less for the thinnest section of the weld is acceptable.

9.0 In case of Failure of the first set of 3 samples, duplicate set of 3 samples shall be tested, and if it passes the test, the material is acceptable.

LABORATORY WELD CORROSION RESISTANCE TEST FOR
AUSTENITIC STAINLESS STEELS - ELECTRIC ARC WELDED
SAMPLES ONLY
(301, 304, 316, 321)

- 1.0 One sample from each ordered quantity lot of 100 MT or part there of in each thickness and grade is subjected to the copper - copper sulfate - 16% sulfuric acid test to determine the intergranular corrosion resistance of the welds.

- 2.0 Approximately 75 to 100 mm long samples or as required for the test, longitudinal to the direction of rolling with weld in centre across the direction of rolling of width about 25 mm shall be tested.

A suitable sample of an austenitic stainless steel weld embedded in copper shot or grindings, is exposed to boiling acidified copper sulfate solution for 24 hours. After exposure in the boiling solution, the specimen is bent and samples shall be observed with naked eye on the outer bend area for cracks.

- 3.0 A 1-L glass Erlenmeyer flask with a ground 45/50 glass joint and four -bulb (minimum) Allihn condenser with 45/50 ground glass joint are required.

- 4.0 Specimen supports - An open glass cradle capable of supporting the specimens and copper shot or grindings in the flask is recommended.
- 5.0 Heat Source - Any gas or electrically heated hot plate may be utilized for heating the test solution and keeping it boiling throughout the test period.
- 6.0 Dissolve 100 g of copper sulfate ($CuSO_4 \cdot 5H_2O$) in 700 mL of distilled water, add 100 mL of sulfuric acid (H_2SO_4 , cp, sp gr 1.84), and dilute to 1000 mL with distilled water.
- 7.0 Electrolytic grade copper shot or grindings is to be used to cover all surfaces of the specimen whether it is in a vented glass cradle or embedded in a layer of copper shot on the bottom of the test flask.
- 8.0 The amount of copper used, assuming an excess of metallic copper is present, is not critical.
- 9.0 The copper shot or grindings may be reused if they are cleaned in warm tap water after each test.
- 10.0 Specimens obtained by shearing should have the sheared edges machined or ground off prior to testing. Care should be taken when grinding to avoid overheating or "burning".

- 11.0 Any scale on the specimens should be removed mechanically or chemically.
- 12.0 Each specimen should be degreased using a cleaning solvent such as acetone, alcohol, ether, or a vapor degreaser prior to being tested.
- 13.0 The volume of acidified copper sulfate test solution used should be sufficient to completely immerse the specimens.
- 14.0 As many as three specimens can be tested in the same container. It is ideal to have all the specimens in one flask to be of the same grade.
- 15.0 The test specimen(s) should be immersed in ambient test solution which is then brought to a boil and maintained boiling throughout the test period. Begin timing the test period when the solution reaches the boiling point.
- 16.0 The time of the test shall be 24 hours.
- 17.0 The test specimen with weld at centre shall be bent through 180° and over a diameter equal to the 4 times thickness of the specimen being bent. In no case shall the specimen be bent over a smaller radius or through a greater angle. The bending shall be such that the face side of the weld is seen outside.

18.0 The bent specimen shall be examined with naked eye on the outer side at welds. The appearances of cracks on the weld area indicate the presence of intergranular corrosion attack and are rejected.

Cracking that originates at the edge of the specimen and the appearance of deformation lines, wrinkles, or "orange peel" on the surface, without accompanying cracks, are not a cause of rejection.

19.0 In case the first sample tested fails, a duplicate sample shall be tested and if it passes, the material is acceptable.

TABLE - 1, STEEL GRADES AND THEIR CHEMICAL COMPOSITION AS DETERMINED BY LADLE ANALYSIS

Material	C %	Mn%	Si %	S %	P %	Cr %	Mo %	Ni %	Others
Designation/ Grade									
FERRITIC STEELS									
X2 Cr Ti 12 (409)	≤ 0.03	1.0 max	1.0 max	0.030 max	0.040 max	10.5 to 12.5	-	-	Ti 6 x % C min upto 1.0 max
X2 Cr Ni 12(409M) (IRSM 44)	≤ 0.03	0.5 to 1.5	1.0 max	0.030 max	0.040 max	10.5 to 12.5	-	0.3 to 1.0	N-0.03 max
X6 Cr 17 (430)	≤ 0.08	1.0 max	1.0 max	0.030 max	0.040 max	16 to 18	-	-	-
AUSTENITIC STEELS									
X5 Cr Ni 18 10 (304)	≤ 0.07	2.0 max	1.0 max	0.030 max	0.045 max	17 to 19	-	8.5 to 10.5	-
X2 Cr Ni N 18 7 (301)	≤ 0.08	2.0 max	1.0 max	0.030 max	0.045 max	16 to 18	-	6 to 8	-
X6 Cr Ni Ti 18 10 (321)	≤ 0.08	2.0 max	1.0 max	0.030 max	0.045 max	17 to 19	-	9 to 12	Ti 5 x C% min upto 0.80 max.
X5 Cr Ni Mo 17 12 2 (316)	≤ 0.07	2.0 max	1.0 max	0.030 max	0.045 max	16 to 18	2.0 to 2.5	10.5 to 13.5	-

TABLE - 1a**CHEMICAL COMPOSITION VARIATION FROM LADLE ANALYSIS**

Element	Limits of ladle analysis Percent		Permissible Deviation Percent
	Over	Up to and including	
C	-	0.030	+ 0.005
	0.030	0.200	± 0.010
	0.200	0.600	± 0.020
	0.600	1.200	± 0.030
Cr	10.0	15	± 0.150
	15.0	20	± 0.200
	20.0	30	± 0.250
Mo	-	0.60	± 0.030
	0.60	1.75	± 0.050
	1.75	3.00	± 0.100
Ni	-	1.00	± 0.030
	1.00	5.00	± 0.070
	5.00	10.0	± 0.100
	10.0	20.0	± 0.150
	20.0	30.0	± 0.200

TABLE - 2

**MECHANICAL PROPERTIES OF COLD ROLLED PRODUCTS
(6 MM THICKNESS MAXIMUM)**

Designation/ Grade	Condition	Min. Yield Stress or 0.2% proof stress (N/mm ²) transverse	Tensile Strength (N/mm ²) Transverse	Min. Elongation at fracture (%) at 50 mm gauge length
FERRITIC STEELS				
X2 Cr Ti 12(409)	2D/2B	220	390 to 560	20
X2 Cr Ni 12(409M)	2D/2B	320	450 to 650	20
X6 Cr 17(430)	2D/2B	270	450 to 600	20
AUSTENITIC STEELS				
X5 Cr Ni 18 10(304)	2D/2B	235	550 to 750	40
	Work- hardened	350	700 min.	25
X2 Cr Ni N 18 7 (301)	2D/2B	350	600 to 900	40
	Work hardened	500	800 min.	20
X6 Cr Ni Ti 18 10 (321)	2D/2B	245	540 to 740	40
X5 Cr Ni Mo 17 12 2 (316)	2D/2B	255	550 to 700	40
Note : if the fracture of the tensile test piece is outside gauge length, the test shall be discarded and retest conducted. To facilitate this, sufficient number of test pieces shall be prepared.				

TABLE - 3**GUIDELINE INFORMATION ON FILLER METALS FOR ARC WELDING**

Parent Metal A	Suitable filler metal (material No.) as specified in AWS	Parent Metal B					
		X2 Cr Ti 12 (409)	X2 Cr Ni 12 (409M)	X5 Cr Ni 18 10 (304)	X2 Cr Ni N 18 7 (301)	X6 Cr Ni Ti 18 10 - (321)	X5 Cr Ni Mo 17 12 2 (316)
X2 Cr Ti 12 (409)	E 308L - 15	X	-	-	-	-	-
X2 Cr Ni 12 (409M) IRSM - 44	E-308L-15	X	X	-	-	-	-
X5 Cr Ni 18 10 (304)	E 308L - 15	X	X	X	-	-	-
X2 Cr Ni N 18 7 (301)	E 308L - 15	X	X	X	X	-	-
X6 Cr Ni Ti 18 10 (321)	E 347 - 15	X	X	X	X	X	-
X5 Cr Ni Mo 17 12 2 (316)	E 316L - 15	X	X	X	X	X	X

Note that where grade x6 Cr 17 is to be welded, only the resistance welding process should be used. For welding any SS with M-41, use the corresponding SS electrode only as per table.

TABLE - 4

**RESISTANCE TO INTER CRYSTALLINE CORROSION
(FOR 2D & 2B FINISH MATERIAL)**

Material		Resistance to inter crystalline corrosion (tested as per ASTM A262 Practice E)	Smallest inside bending (180°) radius for a thickness, 't' not exceeding 6 mm
Designation	Grade	In the condition of supply	
X5 Cr Ni 18 10	304	Yes	1 t
X2 Cr Ni N 18 7	301	Yes	1 t
X6 Cr Ni Ti 18 10	321	Yes	1 t
X5 Cr Ni Mo 17 12 2	316	Yes	1 t

TABLE -5

HEAT TREATMENT CONDITION

COLD ROLLED PRODUCTS		
2D	Cold rolled annealed and pickled.	Uniform Dull finish for thickness of 5 and 6 mm.
2B	Cold rolled annealed, pickled and skin passed.	Smoother finish and thickness upto and including 4 mm.
No.4	Cold rolled, annealed, pickled, and polished with 120-150 grit abrasive.	Decorative finish. For thickness of 1.00 to 2.5 mm.