Notice No.2

Rules for the
Manufacture, Testing and Certification of Materials
July 2018

The status of this Rule set is amended as shown and is now to be read in conjunction with this and prior Notices. Any corrigenda included in the Notice are effective immediately.

Please note that corrigenda amends to paragraphs, Tables and Figures are not shown in their entirety.

Issue date: June 2019

Amendments to	Effective date	IACS/IMO implementation (if applicable)
Chapter 1, Section 1	1 July 2019	N/A
Chapter 3, Sections 1 & 5	1 July 2019	N/A
Chapter 3, Section 3	Corrigendum	N/A
Chapter 3, Sections 6 & 9	1 July 2019	1 July 2019
Chapter 6, Section 1	1 July 2019	N/A
Chapter 10, Sections 1 & 2	1 July 2019	N/A
Chapter 10, Section 2	Corrigenda	N/A
Chapter 11, Sections 1, 3, 4, 5 & 7	1 July 2019	1 July 2019
Chapter 12, Section 2	1 July 2019	1 July 2019
Chapter 13, Section 8	Corrigendum	N/A

Lloyd's Register

Chapter 1
General Requirements

■ *Section 1*
Scope

1.1 General

1.1.8 Materials, manufacturing processes and inspection methods not listed in the *Rules for the Manufacture, Testing and Certification of Materials, July 2018* will be specially considered.

Chapter 3
Rolled Steel Plates, Strip, Sections and Bars

■ *Section 1*
General requirements

1.7 Dimensional tolerances

1.7.3 For materials of nominal thickness 5 mm and more intended for hull structural purposes as detailed in *Ch 3, 2 Normal strength steels for ship and other structural applications*, *Ch 3, 3 Higher strength steels for ship and other structural applications* and *Ch 3, 10 High strength steels for welded structures*, the minus tolerance on thickness of plates, strip and wide flats, where the width is greater than or equal to 600 mm, is 0,3 mm, irrespective of nominal thickness. ~~For wide flats, this applies only where the width is greater than or equal to 600 mm.~~ The average thickness of a product or products is not to be less than the nominal thickness. ~~For thicknesses below 5 mm, the thickness tolerances are to be specially agreed.~~ Plus tolerance is to be in accordance with a National or International ~~s~~Standard unless agreed otherwise by LR and the purchaser.

1.7.4 Class C of ISO 7452 or equivalent National or International Standards may be applied in lieu of *Ch 3, 1.7 Dimensional tolerances 1.7.3*. Where this standard is applied, ~~both the requirements in *Ch 3, 1.7 Dimensional tolerances 1.7.11* and the portion of the footnote of Table B.2 in ISO 7542, that reads; 'Also a minus side of thickness of 0,3 mm is permitted', are not applicable. Additionally, if ISO 7452 is applied,~~ the steel mill is to ensure that the number of measurements and measurement distribution is appropriate to establish that the plates produced are greater than or equal to the specified nominal thickness.

1.7.5 For materials of nominal thickness below 5 mm intended for hull structural purposes as detailed in *Ch 3, 2 Normal strength steels for ship and other structural applications*, *Ch 3, 3 Higher strength steels for ship and other structural applications* and *Ch 3, 10 High strength steels for welded structures*, the minus tolerances on thickness of plates, strip and wide flats, where the width is greater than or equal to 600 mm, is 0,3 mm. The plus tolerance is to be in accordance with Class B of ISO 7452 or an equivalent National or International Standard.

Existing paragraphs 1.7.5 and 1.7.6 have been renumbered 1.7.6 and 1.7.7.

1.7.8 The dimensional tolerances for the products intended for the construction of lifting appliances are to be agreed with LR.

Existing paragraphs 1.7.7 to 1.7.15 have been renumbered 1.7.9 to 1.7.17.

■ *Section 3*
Higher strength steels for ship and other structural applications

3.5 Mechanical tests

Table 3.3.6 Mechanical properties for acceptance purposes (*see* Note 1)

Grades (*see* Note 3)	Yield Stress N/mm^2 min.	Tensile Strength N/mm^2 ~~min.~~	Charpy V-notch impact tests (*see* Notes 3, 4, 6 and 6) Average energy J minimum
			t ≤ 50 mm

■ *Section 5*
Steels for machinery fabrications

5.1 General

Existing Table 3.5.1 has been deleted and replaced with the following:

Table 3.5.1 Under thickness tolerances

Nominal thickness, *t* (mm)	Minus tolerance on nominal thickness (mm)
3 ≤ *t* < 5	−0,3
5 ≤ *t* < 8	−0,4
8 ≤ *t* < 15	−0,5
15 ≤ *t* < 25	−0,6
25 ≤ *t* < 40	−0,7
40 ≤ *t* < 80	−0,9

80 ≤ *t* < 150	−1,1
150 ≤ *t* < 250	−1,2
t ≥ 250	−1,3

■ *Section 6*
~~Ferritic~~ Carbon–manganese and nickel alloy steels for low temperature service

6.4 Mechanical tests

6.4.6 The results of all tensile tests are to comply with the appropriate requirements given in *Table 3.6.3 Mechanical properties for acceptance purposes (see Note 1)*. For carbon–manganese steel grades, the ~~The~~ ratio between the yield stress and the tensile strength is not to exceed 0,9 for normalised and TM steels and 0,94 for QT steels.

■ *Section 9*
Bars for welded chain cables

9.4 Heat treatment

Table 3.9.1 Chemical composition of killed steel bars

Grade	Chemical composition %												
	C max.	Si	Mn	P max.	S max.	Al	Nb max.	V max.	N max.	Cr max.	Cu max.	Ni max.	Mo max.
U1	0,20	0,15–0,35	0,40 min.	0,04	0,04	—	—	—	—	—	—	—	—
U2	0,24	0,15–0,55	1,60 max.	0,035	0,035	0,02 min. *see* Note 1	—	—	—	—	—	—	—
U3	0,33	0,15–0,~~35~~55	1,90 max.	0,~~040~~35	0,~~040~~35	0,065 max. *see* Note 2	0,05 *see* Note 2	0,10 *see* Note 2	0,015	0,25	0,35	0,40	0,08
Note 1. Aluminium may be partly replaced by other grain refining elements. Note 2. To obtain fine grain steel, at least one of these grain refining elements must be present in sufficient amount.													

Chapter 6
Steel Pipes and Tubes

■ *Section 1*
General requirements

1.12 Identification

(Part only shown)
1.12.1 Pipes and tubes are to be clearly marked by the manufacturer in accordance with the requirements of *Ch 1 General Requirements*. The following details are to be shown on all materials which have been accepted:

~~(e) The personal stamp of the Surveyor responsible for the final inspection.~~

Chapter 10
Equipment for Mooring and Anchoring

■ *Section 1*
Anchor

1.4 Cast steel anchors

(Part only shown)

1.4.4 When drop and hammering tests are required, they are to be carried out as follows:

(b) Separately cast ~~flukes,~~ shanks and shackles are to be suspended horizontally from a clear height of 4 m before being dropped. Cast anchor flukes are to be suspended vertically, from a clear height of 4 m before being dropped. Alternatively, a horizontal drop test for the anchor fluke can be carried out as agreed by the manufacturer and Surveyor.

■ *Section 2*
Stud link chain cables for ships

2.5 Forged chain cables

Table 10.2.2 Chemical composition of butt welded and forged chain cable

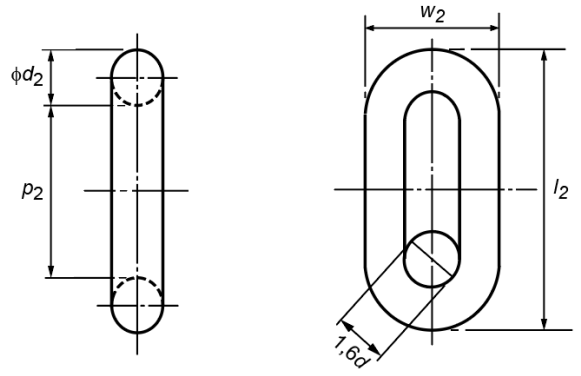
Grade	Chemical composition %												
	C max.	Si	Mn	P max.	S max.	Al	N max.	Cr max.	Cu max.	Nb max.	Ni max.	V max.	Mo max.
U1	0,20	0,15 – 0,35	0,40 min.	0,04	0,04	—	—	—	—	—	—	—	—
U2	0,24	0,15 – 0,55	1,60 max.	0,035	0,035	0,02 min. *see* Note 1	—	—	—	—	—	—	—
U3	0,33	0,15 – 0,~~35~~55	1,90 max.	0,~~04~~03 5	0,~~04~~03 5	0,065 max. *see* Note 2	0,015	0,25	0,35	0,05 *see* Note 2	0,40	0,10 *see* Note 2	0,08

Note 1. Aluminium may be partly replaced by other grain refining elements.
Note 2. To obtain fine grain steel, at least one of these grain refining elements must be present in sufficient amount.

2.13 Fittings for chain cables

2.13.8 All chain cable accessories, including spares, are to be subjected to the proof loads appropriate to the grade and size of cable for which they are intended. These include shackles, swivels, swivel shackles, enlarged links and end links. Anchor shackles, however, are to be tested in combination with the anchor~~, *see* Ch 10, 1.5 Forged steel anchors~~.

2.16 Certification



d = nominal diameter of common stud link
d_2 = nominal diameter of end link = 1,2d ~~(d_2 = 1,2d)~~
l_2 = $p_2 + 2d_2 \approx 6{,}75d$ to $7d$
p_2 = $3{,}65d_2 \approx 4{,}35d$
w_2 = $3{,}3d_2 \approx 4d$

Figure 10.2.4 End link

Chapter 11
Approval of Welding Consumables

■ *Section 1*
General

1.1 Scope

(Part only shown)

1.1.1 Provision is made in this Chapter for the approval by Lloyd's Register (hereinafter referred to as 'LR') of electrodes, wires, fluxes and other consumables intended for use in the welding of the following types of materials:

(a) Steel of various grades as represented by Grade A through to Grade ~~FH69~~ EH96, *see Ch 11, 3 Electrodes for manual and gravity welding* to *Ch 11, 7 Consumables for use in one-side welding with temporary backing materials*.

1.2 Grading

1.2.1 Consumables for welding structural steels are graded into ~~ten~~ twelve strength levels, and each of these is further subdivided into several levels in respect of notch toughness. The five basic levels of toughness are indicated by a number (1 to 5). Normal tensile strength is indicated by `N'. Higher tensile strength is indicated by `Y', and if the yield strength is higher than 375 N/mm^2 the Y is followed by a number (40 to ~~69~~96), as shown in *Table 11.1.1 Welding consumable grades appropriate to structural and low temperature service steel grades*.

(Part only shown)

Table 11.1.1 Welding consumable grades appropriate to structural and low temperature service steel grades

Consumables grade	Suitable for steel grades (*see* Notes)			
2. High Strength Steels (*Ch 3, 10 High strength steels for welded structures*) *see* Note 3				
3Y69	AH62	AH69	—	—
3Y69	DH62	DH69	—	—
4Y69	EH62	EH69	—	—
5Y69	FH62	FH69	—	—
3Y89	AH89	—	—	—
3Y89	DH89	—	—	—
4Y89	EH89	—	—	—
3Y96	AH89	AH96	—	—
3Y96	DH89	DH96	—	—
4Y96	EH89	EH96	—	—
3. Ferritic Low Temperature Service Steels (*Ch 3, 6 Ferritic steels for low temperature service*)				
Note 3. Approval of consumables intended for welding high strength steels in *Ch 3, 10 High strength steels for welded structures* also includes the standard ship steel grades as shown in bold italic type and equivalent low temperature service steel grades referenced in *Ch 3, 6 Ferritic steels for low temperature service*.				

■ *Section 3*

Electrodes for manual and gravity welding

3.1 Grading

(Part only shown)

Table 11.3.1 Minimum low hydrogen approval requirements for manual and gravity electrodes

Approval grades	Low hydrogen grade required
3Y69 to 5Y69	H5
3Y89 to 4Y89	H5
3Y96 to 4Y96	H5

3.1.8 Electrodes approved for strength level Y89 are considered suitable for this strength level only.

3.1.9 Electrodes approved for strength level Y96 are also considered suitable for welding steels in one strength level below that for which they have been approved.

Existing paragraphs 3.1.8 and 3.1.9 have been renumbered 3.1.10 and 3.1.11.

3.2 Deposited metal test assemblies

(Part only shown)

Table 11.3.2 Requirements for deposited metal tests (covered electrodes)

Grade (*see* Note 3)	Yield stress N/mm^2 minimum	Tensile strength N/mm^2 (*see* Note 1)	Elongation on 50 mm % minimum	Charpy V-notch impact tests	
				Test temperature °C	Average energy (*see* Note 2) J minimum
3Y40	400	510 – 690	22	–20	47
3Y42	420	~~530~~ 520 – 680	20	–20	47
3Y46	460	~~570~~ 540 – 720	20	–20	47
3Y50	500	~~610~~ 590 – 770	18	–20	50
3Y55	550	~~670~~ 640 – ~~830~~ 820	18	–20	55
3Y62	620	~~720~~ 700 – 890	18	–20	62
3Y69	690	770 – 940	17	–20	69
3Y89	890	940 – 1100	14	–20	69
3Y96	960	980 – 1150	13	–20	69
4Y40	400	510 – 690	22	–40	47
4Y42	420	~~530~~ 520 – 680	20	–40	47
4Y46	460	~~570~~ 540 – 720	20	–40	47
4Y50	500	~~610~~ 590 – 770	18	–40	50
4Y55	550	~~670~~ 640 – ~~830~~ 820	18	–40	55
4Y62	620	~~720~~ 700 – 890	18	–40	62
4Y69	690	770 – 940	17	–40	69
4Y89	890	940 – 1100	14	–40	69
4Y96	960	980 – 1150	13	–40	69
5Y40	400	510 – 690	22	–60	47
5Y42	420	~~530~~ 520 – 680	20	–60	47
5Y46	460	~~570~~ 540 – 720	20	–60	47
5Y50	500	~~610~~ 590 – 770	18	–60	50
5Y55	550	~~670~~ 640 – ~~830~~ 820	18	–60	55

5Y62	620	~~720~~ 700 – 890	18	–60	62
5Y69	690	770 – 940	17	–60	69

Note 1. Single values are the minimum requirements.

Note 2. Energy values from individual impact test specimens are to comply with *Ch 11, 1.4 Approval procedures 1.4.3*.

Note 3. Grade 1Y is not applicable to SMAW consumables referenced in *Ch 11, 3 Electrodes for manual and gravity welding*.

3.3 Butt weld test assemblies

Table 11.3.3 Requirements for butt weld tests (covered electrodes)

Grade (*see* Note 3)	Tensile strength N/mm^2	Bend test ratio: $\frac{D}{t}$	Charpy V-notch impact tests	
			Test temperature °C	Average energy (*see* Note 1) J minimum
				All positions (*see* Note 2)
3Y40	510	3	–20	47 (39)
3Y42	~~530~~ 520 – 680	4	–20	47
3Y46	~~570~~ 540 – 720	4	–20	47
3Y50	~~610~~ 590 – 770	4	–20	50
3Y55	~~670~~ 640 – ~~830~~ 820	5	–20	55
3Y62	~~720~~ 700 – 890	5	–20	62
3Y69	770 – 940	5	–20	69
3Y89	940	6	–20	69
3Y96	980	7	–20	69
4Y40	510	3	–40	47 (39)
4Y42	~~530~~ 520 – 680	4	–40	47
4Y46	~~570~~ 540 – 720	4	–40	47
4Y50	~~610~~ 590 – 770	4	–40	50
4Y55	~~670~~ 640 – ~~830~~ 820	5	–40	55
4Y62	~~720~~ 700 – 890	5	–40	62
4Y69	770 – 940	5	–40	69
4Y89	940	6	–40	69
4Y96	980	7	–40	69
5Y40	510	3	–60	47 (39)
5Y42	~~530~~ 520 – 680	4	–60	47
5Y46	~~570~~ 540 – 720	4	–60	47
5Y50	~~610~~ 590 – 770	4	–60	50
5Y55	~~670~~ 640 – ~~830~~ 820	5	–60	55
5Y62	~~720~~ 700 – 890	5	–60	62
5Y69	770 – 940	5	–60	69

Note 1. Energy values from individual impact test specimens are to comply with *Ch 11, 1.4 Approval procedures 1.4.3*.

Note 2. Values in ( ) apply only to welds made in the vertical position with upward progression.

Note 3. Grade 1Y is not applicable to SMAW consumables referenced in *Ch 11, 3 Electrodes for manual and gravity welding*.

3.10 Annual tests

3.10.6 A hydrogen test is required for Y89 and Y96 grades.

■ *Section 4*
Wire-flux combinations for submerged-arc automatic welding

4.1 General

(Part only shown)

Table 11.4.1 Minimum low hydrogen approval requirements for wire-flux combinations

Approval grade	'H' grade for Multi-run	'H' grade for Two-run
3Y69 to 5Y69	H5	H5
3Y89 to 4Y89	H5	H5
3Y96 to 4Y96	H5	H5
Note 1. NR – Not required. Approval can be obtained when requested. Note 2. Assumes use of an austenitic, non-transformable, filler material.		

4.1.10 Wire-flux combinations approved with multi-run technique for strength level Y89 are considered suitable for welding steels only in this strength level.

4.1.11 Wire-flux combinations approved with multi-run technique for strength level Y96 are also considered suitable for welding steels in one strength level below that for which they have been approved.

Existing paragraphs 4.1.10 to 4.1.13 have been renumbered 4.1.12 to 4.1.15.

4.3 Deposited metal test assemblies (multi-run technique)

(Part only shown)

Table 11.4.2 Requirements for deposited metal tests (wire-flux combinations)

Grade	Yield stress N/mm^2 minimum	Tensile strength N/mm^2	Elongation on 50 mm % minimum	Charpy V-notch impact tests	
				Test temperature °C	Average energy (*see* Note) J minimum
3Y40	400	510 – 690	22	–20	39
3Y42	420	~~530~~ 520 – 680	20	–20	47
3Y46	460	~~570~~ 540 – 720	20	–20	47
3Y50	500	~~610~~ 590 – 770	18	–20	50
3Y55	550	~~670~~ 640 – ~~830~~ 820	18	–20	55
3Y62	620	~~720~~ 700 – 890	18	–20	62
3Y69	690	770 – 940	17	–20	69
3Y89	890	940 – 1100	14	–20	69
3Y96	960	980 – 1150	13	–20	69
4Y40	400	510 – 690	22	–40	39
4Y42	420	~~530~~ 520 – 680	20	–40	47
4Y46	460	~~570~~ 540 – 720	20	–40	47
4Y50	500	~~610~~ 590 – 770	18	–40	50
4Y55	550	~~670~~ 640 – ~~830~~ 820	18	–40	55
4Y62	620	~~720~~ 700 – 890	18	–40	62
4Y69	690	770 – 940	17	–40	69
4Y89	890	940 – 1100	14	–40	69

4Y96	960	980 – 1150	13	–40	69
5Y40	400	510 – 690	22	–60	39
5Y42	420	~~530~~ 520 – 680	20	–60	47
5Y46	460	~~570~~ 540 – 720	20	–60	47
5Y50	500	~~610~~ 590 – 770	18	–60	50
5Y55	550	~~670~~ 640 – ~~830~~ 820	18	–60	55
5Y62	620	~~720~~ 700 – 890	18	–60	62
5Y69	690	770 – 940	17	–60	69

4.4 Butt weld test assemblies (multi-run technique)

(Part only shown)

Table 11.4.3 Requirements for butt weld tests (wire-flux combinations)

Grade	Tensile strength N/mm^2	Bend test ratio: $\frac{D}{t}$	Charpy V-notch impact tests	
			Test temperature °C	Average energy (*see* Notes 1 and 2) J minimum
3Y40	510	3	–20	39
3Y42	~~530~~ 520 – 680	4	–20	47 (41)
3Y46	~~570~~ 540 – 720	4	–20	47
3Y50	~~610~~ 590 – 770	4	–20	50
3Y55	~~670~~ 640 – ~~830~~ 820	5	–20	55
3Y62	~~720~~ 700 – 890	5	–20	62
3Y69	770 – 940	5	–20	69
3Y89	940	6	–20	69
3Y96	980	7	–20	69
4Y40	510	3	–40	39
4Y42	~~530~~ 520 – 680	4	–40	47 (41)
4Y46	~~570~~ 540 – 720	4	–40	47
4Y50	~~610~~ 590 – 770	4	–40	50
4Y55	~~670~~ 640 – ~~830~~ 820	5	–40	55
4Y62	~~720~~ 700 – 890	5	–40	62
4Y69	770 – 940	5	–40	69
4Y89	940	6	–40	69
4Y96	980	7	–40	69
5Y40	510	3	–60	39
5Y42	~~530~~ 520 – 680	4	–60	47 (41)
5Y46	~~570~~ 540 – 720	4	–60	47
5Y50	~~610~~ 590 – 770	4	–60	50
5Y55	~~670~~ 640 – ~~830~~ 820	5	–60	55
5Y62	~~720~~ 700 – 890	5	–60	62
5Y69	770 – 940	5	–60	69

4.7 Annual tests

(Part only shown)

4.7.1 Annual tests are to consist of at least the following:

(c) A hydrogen test for Y89 and Y96 grades.

■ *Section 5*
Wires and wire-gas combinations for manual, semi-automatic and automatic welding

5.1 General

5.1.16 Wires and wire-gas combinations approved with multi-run technique for strength level Y89 are considered suitable for welding steels only in this strength level.

5.1.17 Wires and wire-gas combinations approved with multi-run technique for strength level Y96 are also considered suitable for welding steels in one strength level below that for which they have been approved.

Existing paragraph 5.1.16 has been renumbered 5.1.18.

(Part only shown)

Table 11.5.1 Minimum low hydrogen approval requirements for wires and wire-gas combinations

Approval grades	'H' grade for m and S techniques	'H' grade for M technique	'H' grade for T technique
3Y69 to 5Y69	H5	H5	H5
3Y89 to 4Y89	H5	H5	H5
3Y96 to 4Y96	H5	H5	H5

Note 1. NR – Not required. Approval may be obtained when requested.

Note 2. Optional in this case. If low hydrogen approval is not obtained, there is a limitation on the carbon equivalent of the steel which is permitted to be welded.

Note 3. Assumes use of an austenitic, non-transformable, filler material.

5.5 Annual tests

(Part only shown)

5.5.1 Annual tests are to consist of at least the following:

(c) Wires approved for two-run automatic welding:

one butt weld test assembly prepared in accordance with *Ch 11, 5.4 Approval tests for two-run automatic welding* using plates 20 to 25 mm in thickness or the maximum approved thickness. The diameter of wire used is to be reported.

(d) A hydrogen test for Y89 and Y96 grades.

■ *Section 7*
Consumables for use in one-side welding with temporary backing materials

7.1 General

(Part only shown)

Table 11.7.1 Minimum low hydrogen approval requirements for one-side welding with combinations including temporary backing material

Approval grades	'H' grade for m and S techniques	'H' grade for M technique	'H' grade for A technique
3Y69 to 5Y69	H5	H5	H5
3Y89 to 4Y89	H5	H5	H5
3Y96 to 4Y96	H5	H5	H5

7.1.11 Combinations approved with multi-run technique (m, S and M) for strength level Y89 are considered suitable for welding steels in only this strength level.

7.1.12 Combinations approved with multi-run technique (m, S and M) for strength level Y96 are also considered suitable for welding steels in one strength level below that for which they have been approved.

Existing paragraph 7.1.11 has been renumbered 7.1.13.

7.4 Annual tests

7.4.3 A hydrogen test is required for Y89 and Y96 grades.

Chapter 12
Welding Qualifications

■ *Section 2*
Welding procedure qualification tests for steels

2.12 Mechanical test acceptance criteria for steels

(Part only shown)
2.12.1 **Longitudinal all weld metal tensile test:**

(e) For base metal grades with minimum specified yield strength level of 890 and 960 N/mm^2, the weld metal strength may be lower than the minimum specified for the base metal provided that the application has design approval for the undermatching weld metal. In such cases the weld metal strength is not to be less than that specified in the approved design.

2.12.2 **Transverse tensile test:** The tensile strength measured from the transverse tensile test is not to be less than the minimum specified for the base material used in the test. For tanks intended for liquefied gases and for other types of assemblies for base metal grades with minimum specified yield strength level of 890 and 960 N/mm^2, a lower ultimate tensile may be accepted subject to design approval as in *Ch 12, 2.12 Mechanical test acceptance criteria for steels 2.12.1.(d)* and *Ch 12, 2.12 Mechanical test acceptance criteria for steels 2.12.1.(e)* respectively.

(Part only shown)
2.12.4 **Impact toughness tests:**

(d) For quench and tempered steels, the required test temperature and absorbed energy are to be in accordance with that specified for the parent materials. For base metal grades with minimum specified yield strength level of 890 and 960 N/mm^2, the weld metal absorbed energy may be lower than the minimum specified for the base metal provided that the application has design approval for the undermatching weld metal. In such cases the absorbed energy is not to be less than that specified in the approved design.

Chapter 13
Requirements for Welded Construction

■ *Section 8*
Specific requirements for welded aluminium

8.4 Non-destructive examination

Table 13.8.2 Acceptance criteria for surface imperfections of aluminium

Surface discontinuity	Classification according to ISO 6520-1	Acceptance criteria
Uniformly distributed porosity (*see* Note 2)	~~2012~~ 2018	≤ 1 % of area

Table 13.8.3 Acceptance criteria for internal imperfections of aluminium

Internal discontinuity	Classification according to ISO 6520-1	Acceptance criteria (*see* Note 1)
Uniformly distributed porosity (*see* Note 1)	~~2012~~ 2021	0,5 < *t* < 3 mm ≤ 2% of area

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