
**Steel tubes for non-pressure purposes —
Specification**

**Part 3: Steel tubes for rolls for conveyor
belt idles**

ICS 77.140.75

Reference number

DRS 263-3: 2020

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Foreword

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettment as Rwanda Standards.

DRS 263-3 was prepared by Technical Committee RSB/TC 47, *Steel aluminium and related products*.

In the preparation of this standard, reference was made to the following standard:

- 1) SANS 657-3 *Steel tubes for non-pressure purposes — Specification — Part 3: Steel tubes for rolls for conveyor belt idles*

The assistance derived from the above source is hereby acknowledged with thanks.

This second edition cancels and replaces the first edition (RS 263-3: 2015) which has been technically revised.

RS 263 consists of the following parts, under the general title *Steel tubes for non-pressure purposes — Specification*:

- Part 1: *Sections for scaffolding general engineering and structural applications*
- Part 2: *Steel tubes for cycles*
- Part 3: *Steel tubes for rolls for conveyor belt idles*
- Part 4: *Steel tubes for rolls for round, oval, square and rectangular section for furniture.*

Committee membership

The following organizations were represented on the Technical Committee on *Steel aluminium and related products* (RSB/TC 47) in the preparation of this standard.

MANUMETAL

Rwanda Transport Development Agency (RTDA)

HEROCEAN Ltd

AFRIFOAM

IPRC Ngoma

Mota Engil

Ministry of infrastructure (MININFRA)

National quality testing laboratory (NQTLD)

Rwanda Standards Board (RSB) – Secretariat

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Steel tubes for non-pressure purposes — Specification — Part 3: Steel tubes for rolls for conveyor belt idlers

1 Scope

This Draft Rwanda Standard covers the requirements, sampling and test methods of welded steel tubes for use in the manufacture of rolls for conveyor belt idlers.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

RS ISO 6892-1, *Metallic materials – Tensile testing – Part 1: Method of test at room temperature*

3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply

3.1

acceptable

acceptable to the authority administering this standard, or to the parties concluding the purchase contract, as relevant

3.2

defective

steel tube that fails in one or more respects to comply with the relevant requirements of this standard

3.3

lot

not less than 25 and not more than 3 200 tubes of the same nominal outside diameter, nominal wall thickness and length, made by one manufacturer, and submitted at any one time for inspection and testing.

4 Requirements

4.1 Grade and type

4.1.1 Type

Tubes for rolls shall be of electrically (induction/resistance) welded mild steel.

4.1.2 Grade

The grade of the tube shall comply with the properties given in table 1.

Table 1 —Tensile properties of tubes

Yield stress MPA, min	Tensile strength MPa, min	Elongation %, min
230	320	10

4.2 Material

Tubes shall be of steel whose ladle chemical composition complies with the following:

- a) carbon content: 0.25 %, max, (by mass); and
- b) sulfur and phosphorus content: each 0.06 %, max, (by mass).

4.3 Mechanical properties

4.3.1 The tensile strength, yield stress and elongation of a tube shall be determined in accordance with 6.3, and shall be at least the appropriate values given in table 1.

4.3.2 When tested in accordance with 6.7 and 6.8 a tube shall show no sign of cracking.

4.4 Dimensions

4.4.1 Outside diameter and wall thickness

4.4.1.1 The nominal outside diameter, actual outside diameter and of a tube shall be one of the values given in Table 2.

4.4.1.2 The wall thickness shall be at least equal to the appropriate nominal value given in Table 2.

Table 4 — Dimensions of tubes

S/N	Nominal outside diameter	Outside diameter		Ovality Max.	Nominal preferred wall thickness	Nominal alternative wall thickness
		Max.	Min			
1	101	101.8	101	0.4	3	3.5
2	108	108.2	108	0.4	3.8	4.5
3	127	127.2	127	0.4	3.8	4.5 or 6
4	133	133.3	133	0.4	4	6

5	152	152.6	152	0.4	4	6
6	159	159.1	159	0.5	4	6
7	165	165.3	165	0.5	4.5	6
8	178	178.1	178	0.6	4.5	6
9	219	219.4	219	0.6	6	6

4.4.2 Length

Except when tubes of specified "mill cut" length are specified by the purchaser, tubes shall be supplied in random lengths of 5.5 m - 8 m.

4.4.3 Straightness

In any length of tube, any deviation from straightness shall not exceed 1 in 1 000, measured at the midpoint of the tube.

4.4.4 Ovality

4.4.4.1 Ovality of a tube (A) is given by:

$$A = a - b$$

where;

a is the greater diameter; and

b is the lesser diameter.

4.4.4.2 The maximum ovality is specified in Table 2.

4.5 Scarfing

4.5.1 The inner and outer weld protrusion shall be removed by scarfing.

4.5.2 The outer scarfing shall blend smoothly with the outer diameter of the tube and shall not protrude above the tube by more than 0.1 mm or indent within the wall of the tube by more than 0.1 mm.

4.5.3 The inner scarfing shall not stand protrude of the tube wall by more than 0.1 mm or indent within the wall of the tube by more than 0.35 mm.

4.5.4 When tested in accordance with 6.5, the depth or height of the scarfed section over an area of 15 mm either side of the centre line of the scarfed section shall not exceed 0.1 mm.

4.5.5 The longitudinal variation of the scarfing shall not exceed the values indicated in Table 3.

Table 3 — Longitudinal weld variation (Dimensions in millimetres)

S/N	Outside diameter (OD) of tube	Tolerance
1	OD < 127	± 0.15
2	127 ≤ OD ≤ 152.4	± 0.175
3	OD > 152.4	± 0.2

4.5.6 When tested in accordance with 6.6, the protrusion or indent of chatter shall not exceed 0.1 mm.

4.6 Workmanship

4.6.1 Tubes shall have an acceptable finish and shall be free from defects that affect their serviceability.

4.6.2 The presence of superficial “powder” rusting on the surface of uncoated tubes shall not be regarded as prejudicial to the serviceability of the tubes.

4.6.3 Tubes shall be supplied with “mill cut” ends and any deformation shall not extend more than 100 mm from the cut.

4.7 Cross-welds

Tubes for rolls shall have no cross-welds

4.8 Coating

Unless otherwise specified by the purchaser tubes shall be supplied uncoated.

5 Packing and marking

5.1 Packing

Tubes shall be supplied loose or bundled as required. When supplied in bundles, only tubes of the same nominal outside diameter and wall thickness shall be packed together.

5.2 Marking

5.2.1 The following information shall appear in legible and indelible marking on a label or labels attached to at least one bundle, carton or pallet, as relevant, per size of the tube in a consignment. The following information shall be legibly and indelibly marked on each tube in one of the official languages used in Rwanda:

a) manufacturer’s name or trade mark; and

b) batch code (if required).

5.2.2 The following information in one of official languages used in Rwanda shall appear in legible and indelible marking on a label securely attached to each bundle:

- a) manufacturer's name or trade mark;
- b) batch code or order number;
- c) grade and type; and
- d) nominal outside diameter and wall thickness.

6 Inspection and methods of test

6.1 Inspection

Visually examine and measure each tube in the sample for compliance with the requirements of 4.4 - 4.8. If required, sampling shall be done in accordance with annex A.

6.2 Tensile test

Carry out the test in accordance with the relevant test method given in RS ISO 6892-1 and check for compliance with the requirements of 4.3.1. For the determination of elongation, use a gauge length of $5.65\sqrt{S_0}$ (where S_0 is the original cross-sectional area).

6.3 Ovality test

6.3.1 Apparatus

6.3.1.1 V-rollers.

6.3.1.2 Dial gauge with probe.

6.3.2 Test pieces

From the pipe(s) selected for testing, cut a piece of 1 m in length and Deburr the test piece.

6.3.3 Procedure

6.3.3.1 Place a test piece on the v-rollers and position the dial gauge probe in such a way that it touches the outside of the tube at a point diametrically opposite a support roller (see figure 1).

6.3.3.2 Rotate the tube about its longitudinal axis (centreline) and complete a full revolution of the tube.

6.3.3.3 Set the zero point of the dial indicator at the lowest point on the tube circumference and then read the ovality as the maximum deflection of the dial indicator needle.

6.3.3.4 The ovality shall not exceed the values given in table 2.

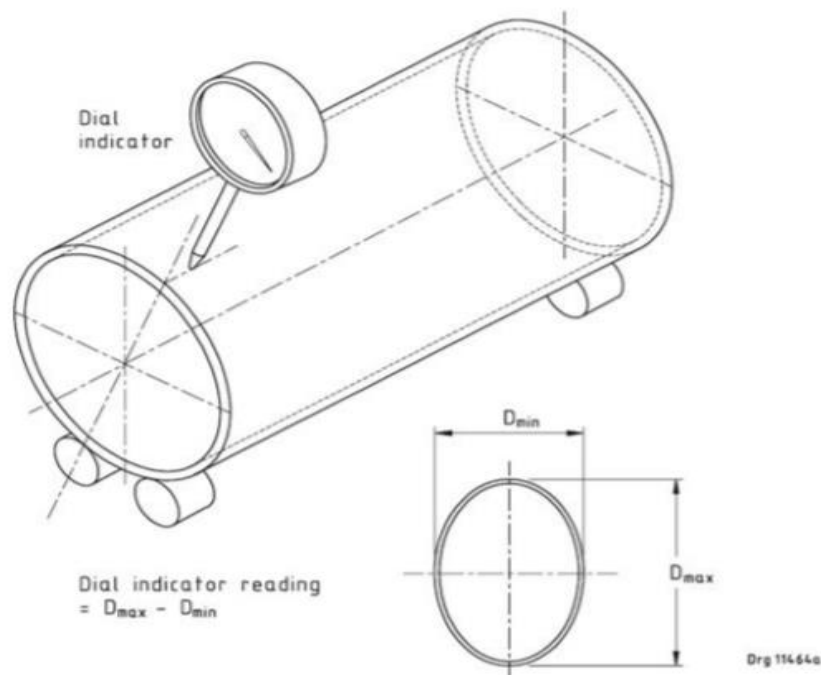


Figure 1 — Test for ovality

6.4 Visual test for scarfing

6.4.1 Apparatus

6.4.1.1 V-rollers.

6.4.1.2 Dial gauge with probe for measuring ovality

6.4.2 Test pieces

From the pipe(s) selected for testing; cut a piece of 1 m in length and Deburr the test piece.

6.4.3 Procedure

6.4.3.1 Place a test piece on the v-rollers and position the dial gauge probe in such a way that it touches the outside of the tube initially away from the scarfed section.

6.4.3.2 Rotate and slide the tube along its longitudinal and horizontal axis as appropriate.

6.4.3.3 Measure the depth or height of the external scarf over the length of the tube covering an area 15 mm either side of the scarfed section of the tube.

6.4.3.4 The depth or height of the scarfed section over this area shall not exceed the values indicated in 4.5.2.

6.5 Visual test for chatter

6.5.1 Apparatus

6.5.1.1 V-rollers.

6.5.1.2 Dial gauge with probe.

6.5.2 Test pieces

From the pipe(s) selected for testing; cut a piece of 1 m in length and Deburr the test piece.

6.5.3 Procedure

6.5.3.1 Place a test piece on the v-rollers and position the dial gauge probe as appropriate.

6.5.3.2 Whilst moving the tube along its longitudinal axis (along the weld seam); measure the height by which the scarfing protrudes above the outer diameter of the tube and the depth of indentation which the scarfing presents beneath the diameter of the tube outer wall.

6.5.3.3 The readings obtained shall not exceed the values indicated in 4.5.4.

6.6 Flattening test (iso standards)

6.6.1 Apparatus

Compressive testing machine with parallel platens of width at least equal to 1.5 times the diameter of the pipe under test.

6.6.2 Test pieces

From the pipe selected for testing; cut two pieces of pipe (at least 40 mm each in length) and Deburr the test pieces.

6.6.3 Procedure

6.6.3.1 Place one test piece in the testing machine with the weld positioned as shown in figure 2(a).

6.6.3.2 Apply a steadily increasing force until the distance between the two platens is $60\% \pm 1\%$ of the actual outside diameter of the pipe (see figure 2(b)).

6.6.3.3 Remove the test piece and examine it for signs of cracking. Check for compliance with 4.3.2.

6.6.3.4 Place one test piece in the testing machine with the weld positioned as shown in figure 2(c).

6.6.3.5 Apply a steadily increasing force until the distance between the two platens is 15 % \pm 1 % of the actual outside diameter of the pipe (see figure 2(d)).

6.6.3.6 Remove the test piece and examine it for signs of cracking. Check for compliance with 4.3.2.

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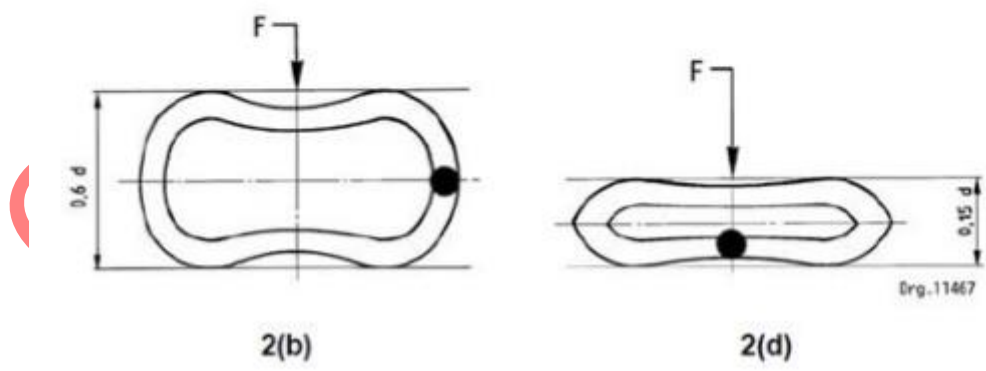
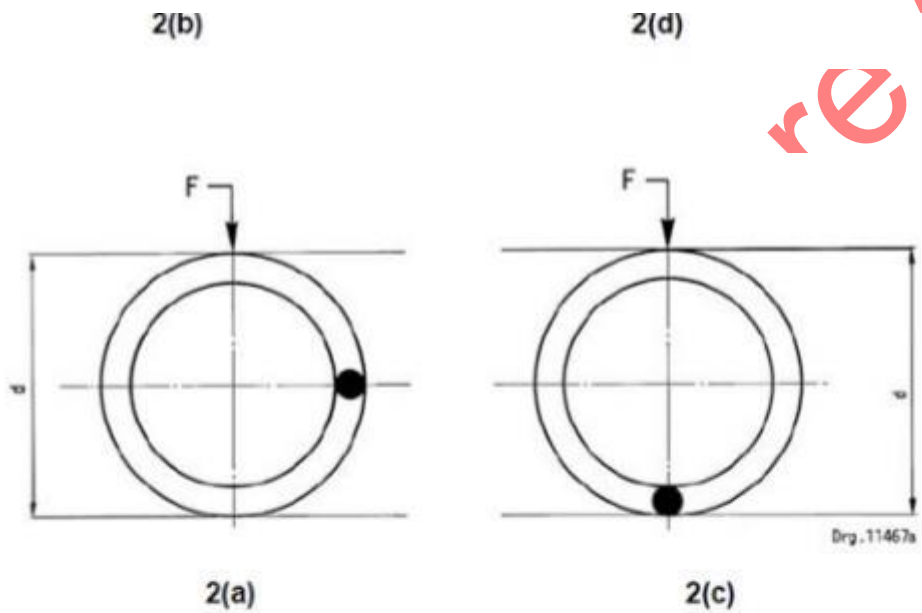


Figure 2 — Flattening test

6.7 Flare test

6.7.1 Apparatus

6.7.1.1 Compressive testing machine;

6.7.1.2 Steel cone of included angle 60° and of base diameter at least 1.1 times the outside diameter of the pipe

6.7.2 Test piece

Cut a piece of suitable length but of length equal to at least the outside diameter of the pipe and Deburr the ends of the test piece.

6.7.3 Procedure

6.7.3.1 Place the cone and the test piece in the testing machine as shown in figure 3.

6.7.3.2 Apply a steadily increasing force until the end of the test piece flares to a diameter $10\% \pm 1\%$ larger than the outside diameter of the pipe.

6.7.3.3 Examine the flared end of the test piece and check for compliance with 4.3.2.

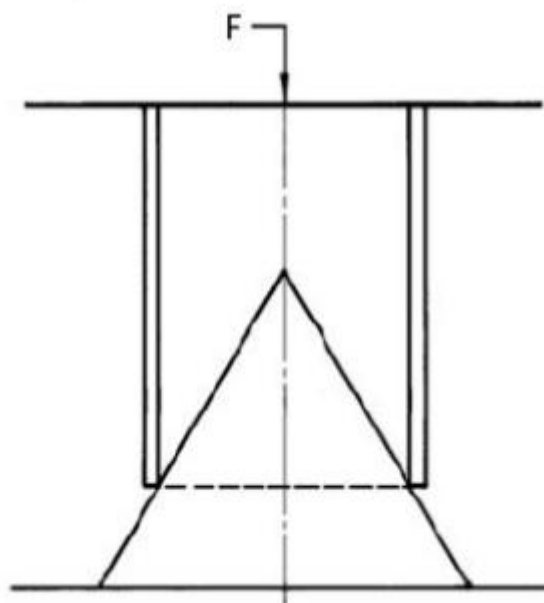


Figure 3 — Flare test

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Annex A (informative)

Sampling and compliance

A.1 Sampling

A.1.1 The following sampling procedure shall be applied in determining whether a lot complies with the relevant requirements of this part of the standard.

Table A.1 — Sampling

Lot size. number of tubes	Sample size. number of tubes	Number of defectives allowed	
		Inspection	Testing
25 – 90	13	0	0
91 - 150	20	1	1
151 - 280	32	2	1
281 - 500	50	3	1
501 – 1 200	80	4	2
1 201 – 3 200	125	5	2

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