

LAMECO STANDARD

LAMINATED SHIMS MATERIALS



The paragraphs numbered from 1.1 to 1.8 concern material specifications.

In whole chapter 2, physical and mechanical properties are indicated for each of them.

Part 4 is devoted to examples of formulations for drawing up demands, plans or any other technical document that may be required.

At the end of the document is a codification of non-peelable products, that are appendixes to the standard.

1. DESCRIPTION

1.1 SHIM MATERIALS

LS1 – Aluminium 1200
 LS2 – Aluminium 5052
 LS18 – Aluminium 1050
 LS19 – Aluminium 1100
 LS3 – Brass CuZn 36/37
 LS4 – Stainless steel AISI 302
 LS5 – Stainless steel AISI 304
 LS6 – Stainless steel AISI 304L
 LS7 – Stainless steel AISI 316
 LS8 – Stainless steel AISI 316L
 LS9 – Carbon steel 1010
 LS10 – Titanium 1 (T35)
 LS11 – Titanium 2 (T40)
 LS12 – Single colour polymer
 LS13* – Two-colour polymer
 LS15* – Carbon fabric
 LS16 – PLUS glass fabric
 LS21 – High-Density glass fabric
 LS17 – BCRW fabric
 LS20 – Polyimide
 LS22 – PolyEtherEtherKetone (PEEK)

For the whole range of INSTANT-PEEL®, CURVPEEL®, PEEL-STICK® or SILENTLINE® products, put "IP", "CP", "PST" or "S" in front of the material required (for example: IPLS7 for AISI 316 stainless steel in INSTANT-PEEL®).

*LS14 has been superseded

NOTA: Other materials can also be made. Replies by return of e-mail.

1.2 TYPE

- A – Fully laminated
- B – Half-laminated (See Type B shim materials in 1.6 below)
- C – Bi-laminated (The products of the DUOPEEL® range are bi-laminated by nature, since they are composed of LS12 and LS13)
- D – Laminated part + solid part + laminated part

1.3 TOTAL THICKNESS

X = Total thickness

1.4 THICKNESS OF LAMINATED SHEETS

- 1 – 0,005 mm / 0.0002 inch (prototype LS17 under test)
- 2 – 0,01 mm / 0.0004 inch
- 3 – 0,012 mm / 0.0005 inch
- 4 – 0,019 mm / 0.0007 inch
- 5 – 0,023 mm / 0.0009 inch
- 6 – 0,025 mm / 0.001 inch
- 7 – 0,05 mm / 0.002 inch
- 8 – 0,075 mm / 0.003 inch
- 9 – 0,1 mm / 0.004 inch

- 10 – 0,11 mm / 0.0043 inch
- 11 – 0,2 mm / 0.008 inch

1.5 LAMINATED SHEETS / MATERIALS

- LS1, LS2, LS7, LS19: 7, 8
- LS4, LS6, LS8, LS11, LS16: 7, 8, 9
- LS5: 2, 6, 7, 8, 9
- LS3, LS9, LS10: 6, 7, 8, 9
- LS12, LS22: 3, 4, 5, 6, 7, 8, 9 & 11
- LS13: 3, 4, 5, 7
- LS15: 10
- LS17: 1
- LS18: 7, 9, 11
- LS20: 8
- LS21: 9

1.6 MATERIALS (TYPE B: SOLID PART)

- 1 – Aluminium A5
- 2 – Aluminium 2024T3
- 3w – Stainless steel 304
- 3y – Stainless steel 304L
- 4w – Carbon steel DC01
- 4y – Carbon steel DC04
- 5 – Titanium AB-1
- 6 – Cotton / phenolic resin fabric
- 7 – Single colour polymer

LAMECO STANDARD

LAMINATED SHIM MATERIALS

1.7 THICKNESS OF SOLID PARTS

- 11 – 0,2 mm / 0.008 inch
- 12 – 0,25 mm / 0.0098 inch
- 13 – 0,4 mm / 0.016 inch
- 14 – 0,5 mm / 0.020 inch
- 15 – 0,6 mm / 0.024 inch
- 16 – 0,8 mm / 0.031 inch
- 17 – 1 mm / 0.039 inch
- 18 – 1,2 mm / 0.047 inch
- 19 – 1,5 mm / 0.059 inch
- 20 – 2 mm / 0.079 inch
- 21 – 2,5 mm / 0.098 inch
- 22 – 3 mm / 0.12 inch
- 23 – 4 mm / 0.16 inch
- 24 – 5 mm / 0.20 inch
- 25 – 6 mm / 0.24 inch

1.8 SOLID PARTS / MATERIALS

- 1: 14, 16, 17, 19, 20, 21, 22, 23, 24
- 2: 16, 18, 19, 20
- 3w: 14, 16, 17, 19, 20, 21, 22, 23, 24, 25
- 3y: 14, 16, 17, 19, 20, 21, 22, 23, 24, 25
- 4w: 14, 16, 17, 19, 20, 21, 22
- 4y: 14, 16, 17, 19, 20, 21, 22
- 5: 17, 19, 20
- 6: 12, 16, 18, 19
- 7: 11

The foregoing data are our standard thicknesses. Other thicknesses are available. Please consult us.

2. PHYSICAL & MECHANICAL CHARACTERISTICS

2.1 DENSITIES

- LS1, LS2 & LS18: 2,8
- LS3: 8,5
- LS4 to LS8: 8,2
- LS9: 7,85
- LS10 & LS11: 4,5
- LS12 & LS13: 1,395
- LS15: 1,05 (10)
- LS16: 1,37 (8) & 1,39 (9)

- LS17: 1
- LS19: 2,71
- LS20: 1,42
- LS21: 1,35
- LS22: 1,3

2.2 COMPRESSIVE FRACTURE STRENGTH LIMITS

- LS1 to LS11, LS18 & LS19 – 1 900 MPa (physical limit of the test machine: no fracture)
- LS12 & LS13 – 600 MPa
- LS15 – 1 570 MPa
- LS16 & LS17 – 1 900 MPa (physical limit of the test machine: no fracture)
- LS22 – 450 MPa

Test results supplied on request.

2.3 PERMANENT RESIDUAL DEFORMATIONS

This data is communicated on request by return of e-mail.

2.4 RESIN TEMPERATURE RESISTANCE *

- LS1 to LS11, LS18 & LS19 – 200°C / 392°F
- LS12, LS13 & LS20 – 130°C / 266°F
- LS15 – 300°C / 572°F
- LS16 – 370°C / 698°F
- LS22 – 250°C / 482°F

2.5 MATERIALS' MAXIMUM TEMPERATURE RESISTANCE AS PER 1.1 ABOVE

This data is communicated on request by return of e-mail.

2.6 MINIMUM (NEGATIVE) TEMPERATURE RESISTANCE

This data is communicated on request by return of e-mail.

2.7 PEELING STRENGTH

This data is communicated on request by return of e-mail.

2.8 BEHAVIOUR UNDER IMMERSION

This data is communicated on request by return of e-mail.

3. INDUSTRIAL SECTORS (NON-EXHAUSTIVE LIST)

- Defence
- Space:
 - launchers,
 - satellites
- Formula 1
- Medical engineering
- Textile engineering
- Production machines and machining units
- Specialised machines
- Aeronautical equipment:
 - landing gear,
 - aircraft manufacturers,
 - helicopter manufacturers,
 - aircraft engine manufacturers,
 - nacelles,
 - structures
- Scientific and research equipment
- Cryogenic systems
- Etc.

*Due to the extremely small quantities of the binding agent used, its destruction above the listed temperature does not affect the shim's operational performance.

LAMECO STANDARD

LAMINATED SHIM MATERIALS

4. FORMULATION - EXAMPLES

4.1 TYPE A

- A/ Without the standard: "PLUS glass fabric, total thickness 2 mm/.079 inch, peelable in 0,05 mm/.002 inch"
- B/ With the standard: "LS16, A, 7, X2"

4.2 TYPE A

- A/ Without the standard: "Brass CuZn 37, total thickness 5 mm/.20 inch, peelable in 0,05 mm/.002 inch"
- B/ With the standard: "LS3, A, 7, X5"

4.3 TYPE A

- A/ Without the standard: "Titanium 1, total thickness 1,2 mm/.047 inch, peelable in 0,025 mm/.001 inch"
- B/ With the standard: "LS10, A, 6, X1.2"

4.4 TYPE A

- A/ Without the standard: "INSTANT-PEEL® Stainless steel AISI 316L, total thickness 2,5 mm/.098 inch, peelable in 0,1 mm/.004 inch"
- B/ With the standard: "IPLS8, A, 9, X2.5"

4.5 TYPE A

- A/ Without the standard: "CURV-PEEL® Stainless steel AISI 304, total thickness 3 mm/.12 inch, peelable in 0,05 mm/.002 inch"
- B/ With the standard: "CPLS5, A, 7, X3"

4.6 TYPE B

- A/ Without the standard: "Total thickness 2 mm/.079 inch, 1 mm/.039 inch stainless steel AISI 304 peelable in 0,1 mm/.004 inch (peelable part first) + 1 mm/.039 inch solid part stainless steel AISI 304L"
- B/ With the standard: "LS5&3y, B, 9&17, X2"

4.7 TYPE B

- A/ Without the standard: "Total thickness 6 mm/.24 inch, 3 mm/.12 inch aluminium 1200 peelable in 0,05 mm/.002 inch (peelable part first) + 3 mm/.12 inch solid part aluminium A5"
- B/ With the standard: "LS1&1, B, 7&22, X6"

4.8 TYPE B

- A/ Without the standard: "Total thickness 4,5 mm/.18 inch, 0,5 mm/.020 inch carbon steel 1010 peelable in 0,025 mm/.001 inch (peelable part first) + 4 mm/.16 inch solid part carbon steel D01"
- B/ With the standard: "LS9&4w, B, 6&23, X4.5"

4.9 TYPE C

- A/ Without the standard: "INSTANT-PEEL® Stainless steel AISI 304, total thickness 10 mm/.39 inch, 1st part thickness (highest value first) 9,8 mm/.385 inch peelable in 0,1 mm/.004 inch & 2nd part thickness 0,2 mm/.008 inch peelable in 0,01 mm/.0004 inch"
- B/ With the standard: "IPLS5, C, 7&2, X10=9.8+0.2"

4.10 TYPE C

- A/ Without the standard: "DUOPEEL®, total thickness 2,5 mm/.098 inch, 1st part thickness (highest value first) 2,3 mm/.09 inch single colour polymer peelable in 0,1 mm/.004 inch & 2nd part thickness 0,2 mm/.008 inch two-colour polymer peelable in 0,025 mm/.001 inch"
- B/ With the standard: "LS12&LS13, C, 9&6, X2.5=2.3+0.2"

4.11 TYPE D

- A/ Without the standard: "Total thickness 6 mm/.24 inch, 1st part thickness (peelable part with highest value first) 1,7 mm/.067 inch carbon steel 1010 peelable in 0,1 mm/.004 inch + 4 mm/.16 inch solid part carbon steel D01 + 2nd part thickness 0,3 mm/.012 inch carbon steel 1010 peelable in 0,05 mm/.002 inch"
- B/ With the standard: "LS9&4w, D, 9&23&7, X6=1.7+4+0.3"

4.12 TYPE D

- A/ Without the standard: "Total thickness 6,3 mm/.25 inch, 1st part thickness (peelable part with highest value first) 3,8 mm/.15 inch stainless steel AISI 304 peelable in 0,10 mm/.004 inch + 1,5 mm/.06 inch solid part stainless steel AISI 304 + 2nd part thickness 1 mm/.039 inch stainless steel AISI 304 peelable in 0,025 mm/.001 inch"
- B/ With the standard: "LS5&3w, D, 9&19&6, X6.3=3.8+1.5+1"

LAMECO STANDARD - APPENDIX

NON PEELABLE MATERIALS

5. APPENDIX - NON PEELABLE MATERIALS

5.1 SOLID SHIMS

Aluminium 1200
 Aluminium 5052
 Aluminium 1050
 Aluminium 1100
 Brass CuZn 36/37
 Stainless steel AISI 302
 Stainless steel AISI 304
 Stainless steel AISI 304L
 Stainless steel AISI 316
 Stainless steel AISI 316L
 Carbon steel 1010
 Titanium 1 (T35)
 Titanium 2 (T40)
 Single colour polymer
 Tinted polymer
 Polyimide
 PolyEtherEtherKetone (PEEK)
 Polytetrafluoroethylene (PTFE)

See the available thicknesses for peelable materials (§ 1.3)

5.2 SHEETS

Aluminium A5
 Aluminium 2024T3
 Stainless steel 304
 Stainless steel 304L
 Stainless steel 316
 Stainless steel 316L
 Carbon steel DC01
 Carbon steel DC04
 Titanium AB-1
 Brass CuZn36

See the available thicknesses for solid parts (§ 1.7) and consult us for materials other than those mentioned in § 1.6.



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