

# PRINCIPLES

## Lameco laminated shims



Any mechanical assembly is built of parts manufactured to specified machining tolerances. In a complex assembly of several hundred or thousand parts these tolerances soon add up. Unpredictable and undesirable clearances will generally be discovered once the assembly is completed. Bad fit leads to harsh wear and tear in use and early, possibly catastrophic mechanical failure.

**LAMECO offers a solution, the superior technology-oriented solution: the Laminated Shim.**

**Principle: precision manufactured from metals or high technology composites (\*) which have the property of being easily peelable into micro fine strips of a few hundredths of a millimeter / of four tenth thousands of an inch.**

### What are the advantages of a laminated shim?

Time saving, precision, repeatability, and predictability. Put that grinding machine to work elsewhere and enjoy the LAMECO laminated shim quality / price ratio.

#### SPEED

LAMECO laminated shims are quickly and easily peeled using a scalpel (or forefinger with INTERCOMPOSITE®, DUOPEEL®, X.FIBER®, COBRA.X®, X.FIBER HIGH-DENSITY®, PEEKPEEL® shims or the entire range of INSTANT-PEEL® metal products shims - see the cards of these products). Therefore it instantly fulfills its function, whereas an adjustment shim has first to be submitted to grinding.

It thus saves considerable time and spares idle time in production.

#### PRECISION

The laminated shim guarantees an optimal precision which pilings cannot achieve in any way.

\*INTERCOMPOSITE®, DUOPEEL®, X.FIBER®, COBRA.X®, INSTANT-PEEL®, X.FIBER HIGH-DENSITY®, PEEKPEEL® - Trademarks registered, see patent numbers on the sheet devoted to each of these products.

# PRINCIPLES

## Lameco laminated shims

### THE LAMECO SPECIALITY: IMPECCABLE QUALITY

Each individual layer of our laminated shims is bonded to the next across its entire surface and not just at the edges.

Furthermore, thanks to our proprietary production processes, they are perfectly flat and entirely devoid of burrs - whether made of metal or composite material.

### STANDARDS

Finally, various standards and numerous specifications have been drafted for the laminated shim definition, use and manufacturing. They result from the work of all industrial sectors involving precise machining and assemblies.

Nowadays, no engineering and design department can design any mechanical assembly without providing for the use of laminated shims.

**This is why, today, laminated metal and composite shims have become indispensable tools.**

## Let us recap

So you're looking for **Peelable Shims**?

- **Truly Peelable?**
- **Without any burrs, a flawless finish that minimizes any risk of cuts?**
- **With entirely reliable delivery times, which on request are the fastest in the industry?**
- **Which guarantees precision to a few hundredths of a millimeter / four tenth thousands of an inch when needed.**

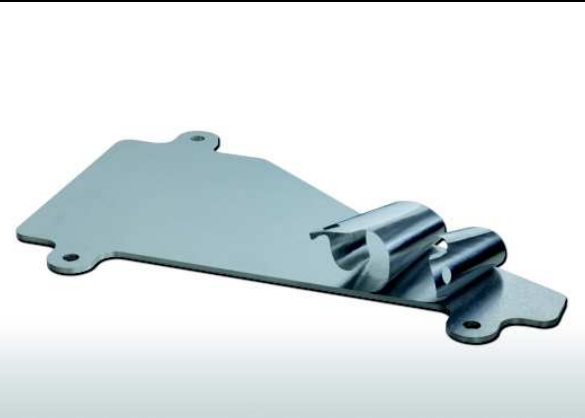
**Choose LAMECO!**



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# HOW DO YOU SELECT THE SUITABLE LAMINATED MATERIAL?



New to laminated shims? Or maybe just wondering which type would best meet your requirements?

There are two key issues to be born in mind:

## First key issue:

### MAXIMUM USE TEMPERATURE

It should be born in mind that the special binder film is extremely fine. After thermal treatment its thickness can be virtually discounted it is so thin. But above a certain temperature (see LAMECO standard), the binder will be destroyed. However, its disappearance does not impact in any way the continued use of the LAMECO shim. The part will continue to work until it is replaced during the maintenance disassembly.

## Second key issue:

### MECHANICAL STRESS

You must first know what pressures and stress will be exerted on the laminated material. If your parts are provided with fixation holes, the only pressure will be that exerted by the tightening of fixing screws. This is only a small pressure. In this case all LAMECO laminated materials can be used without any limitations. For all other cases, please refer to us.

## Conditions of use:

Once you have taken these two factors into account, you can choose which material best suits your requirements by considering the following points:

# HOW DO YOU SELECT THE SUITABLE LAMINATED MATERIAL?

## IF YOU NEED TO PEEL YOUR SHIMS EVEN MORE QUICKLY AND EASILY

All of our composite materials INTERCOMPOSITE®, DUOPEEL®, X.FIBER®, COBRA.X®, X.FIBER HIGH-DENSITY® and PEEKPEEL® can be peeled by fingers alone, no tools required.

The same can be said of all the metallic materials in the INSTANT-PEEL® range.

With any and all of these products peeled leaves stay flat without any distortion, and as a result they can be reused too!

## LIGHTNESS REQUIREMENTS

- If weight reduction is your primary concern (for portability, or more useful carrying capacity, etc.): INTERCOMPOSITE®, DUOPEEL®, X.FIBER®, COBRA.X®, X.FIBER HIGH-DENSITY® and PEEKPEEL® would be perfectly suited to your needs - see cards of these products. They are best recommended as they are the lightest of our products and have an excellent weight/mechanical characteristic ratio whenever minimum weight and outstanding performance are demanded together.
- INTERCOMPOSITE® and DUOPEEL® are not only very fast to use, but are the least expensive of all laminated materials.

## REQUIREMENTS OF ADAPTATION TO CURVED SHAPES

If you want to wedge on curved shapes, INTERCOMPOSITE®, DUOPEEL®, PEEKPEEL® and, according to thicknesses, X.FIBER® and X.FIBER HIGH-DENSITY® can be quickly and easily adapted to most curves without any loss of utility or precision - see the cards of these products.

On the other hand, for metallic materials, we recommend you to make your selection from the range of laminated shims CURVPEEL®, an exclusive process where the required curve radius is incorporated into the shim during production.

## THREE FINAL HINTS

- Steel is best avoided in assemblies presenting a corrosion risk.
- It is better to avoid aluminum, whenever productivity improvement is being sought. Aluminum has a more delicate peel, so is therefore less rapid.
- Finally, it is not advised to use aluminum (or to a lesser extent stainless steel) where galvanic coupling also known as 'fretting' can take place.

**Bearing in mind the temperature at which the shim will be performing, the physical stresses exerted, the presence of difficult curved mating surfaces, or the desirability to save weight in your final assembly should guide you to selecting the correct LAMECO laminated shim for your precise application.**

## LIMITATIONS OF MIXED TECHNIQUE SHIMS (LAMINATIONS PLUS SOLID PARTS)

Once the material has been set out, avoid planning said "solid parts" [or "S.P." = solid stocks, unpeelable part] in strong thicknesses.

- Combining solid metal sections with the laminations actually results in lowered mechanical performance. For this reason when such mixed shims are desired the thickness of the solid metal part should be kept at an absolute minimum.
- It should also be noted that such mixed shims are particularly difficult to manufacture and hence expensive. Consequently, a solid part should be used only in case of special technical constraint. This might occur, for example, when needing a threaded portion contained within the depth of the shim, or a countersink for screw-heads.



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# 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
- LS23 – Carbon steel DC04
- 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, LS10: 6, 7, 8, 9
- LS9: 7, 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
- LS23: 6

#### 1.6 MATERIALS (TYPE B: SOLID PART)

- 1 – Aluminium A5
- 2w – Aluminium 2024T3
- 2y – Aluminium 5052
- 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
- 2w: 16, 18, 19, 20
- 2y: 16, 17, 18, 22
- 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 & LS23: 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 & LS23 – 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  
 Carbon steel DC04  
 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  
 Aluminium 5052  
 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.



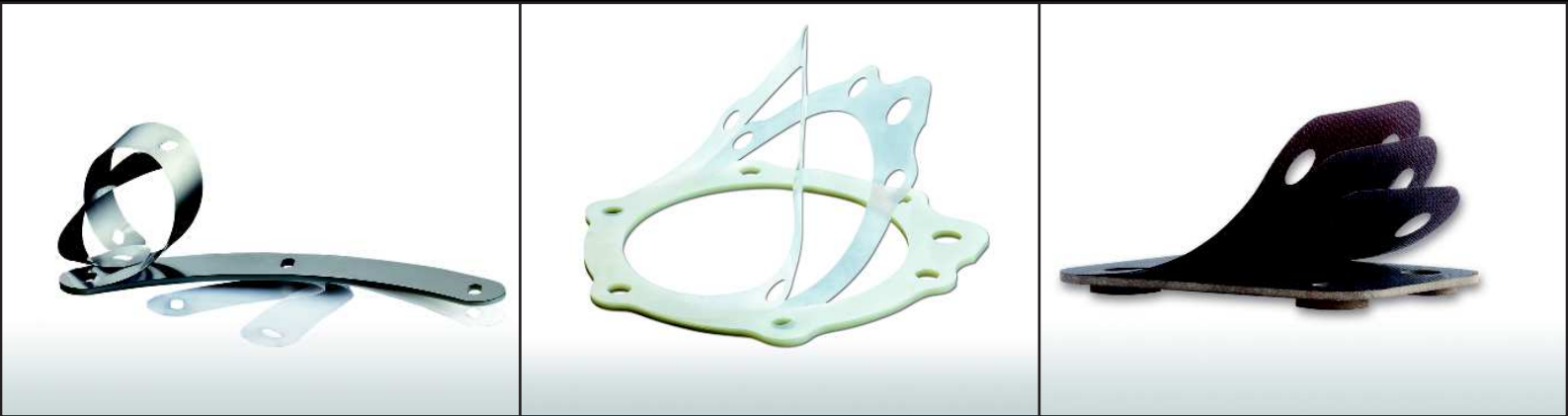
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# PRODUCTS & SERVICES

## Lameco laminated shims



STANDARD / MATERIAL						NORME	SPECIFIC WEIGHT	THICKNESS OF LAMINATIONS (MM / INCH)											
								0,005 .0002	0,010 .0004	0,012 .0005	0,019 .0007	0,023 .0009	0,025 .001	0,05 .002	0,075 .003	0,1 .004	0,11 .0043	0,2 .008	
STD	EN	BS	AISI/SAE	UNS	ISO			1	2	3	4	5	6	7	8	9	10	11	
<b>Aluminium</b>																			
LS1	1200	1200	1200	A91200	Al99,0		2.8							X	X				
LS2	5052	5052	5052	A95052	AlMg2,5	EN 573-3, EN 546-2	2.8							X	X				
LS18	1050	1050A	1050	A91050	Al99,5	AMS-DTL-22499/1 LN 29557-3	2.8							X		X		X	
LS19	1100	1100	1100	A91100	Al99,0Cu		2.71												
<b>Brass</b>																			
LS3	CuZn37	CZ108		C27700	CuZn37	AMS-DTL-22499/2, LN 29557-2	8.5						X	X	X	X			
<b>Stainless Steel</b>																			
LS4	1.4300	304S31	302	S30200			8.2							X	X	X			
LS5	1.4301	304S15	304	S30400		EN 10088-1, EN 10088-2 AMS-DTL-22499/3 LN 29557-1	8.2		X				X	X	X	X			
	1.4350	304S16																	
LS6	1.4306	304S11	304L	S30403			8.2						X	X	X				
LS7	1.4401	316S16	316	S31600		EN 10088-1, EN 10088-2 AMS-DTL-22499/3 LN 29557-1	8.2							X	X				
	1.4436	316S33																	
LS8	1.4404	316S12	316L	S31603		EN 10088-1, EN 10088-2 AMS-DTL-22499/3 LN 29557-1	8.2							X	X	X			
	1.4435	316S13																	
<b>Steel</b>																			
LS9	1.1121	040A10	1010	G10100	1010	EN 10084, AMS-DTL-22499, SAE AMS 6387	7.85							X		X			
LS23	1.0338	14491CR	A620		DC04	EN 10130 & 10139, AMS-DTL-22499, SAE AMS 6387	7.85						X						
<b>Titanium</b>																			
LS10	3.7025	2TA1	Ti Gr1	R50250	5832-2	ASTM B 265	4.5						X	X	X	X			
LS11	3.7035	TA 2	Ti Gr2	R50400	5832-2	AMS-DTL-22499	4.5							X	X	X			
<b>INTERCOMPOSITE®</b>																			
LS12	(polymer/epoxy/polyester)					ISO 15988	1.395			X	X	X	X	X	X	X	X		X
<b>DUOPEEL®</b>																			
LS13*	(metallised polyester)						1.395			X	X	X		X					
<b>X.FIBER®</b>																			
LS15*	(carbon fabric)						1.05											X	
LS16	(PLUS glass fabric)						1.35 to 1.39							X	X	X			
<b>COBRA.X®</b>																			
LS17	(BCRW fabric)						1	X											
<b>PIMYX®</b>																			
LS20	(polyimide)					AMS-DTL-22499	1.42								X				
<b>X.FIBER HIGH-DENSITY®</b>																			
LS21	(high-performance glass fabric)						1.35									X			
<b>PEEKPEEL®</b>																			
LS22	(polyetheretherketone)						1.3			X	X	X	X	X	X	X	X		X

\*LS14 has been superseded

# PRODUCTS & SERVICES

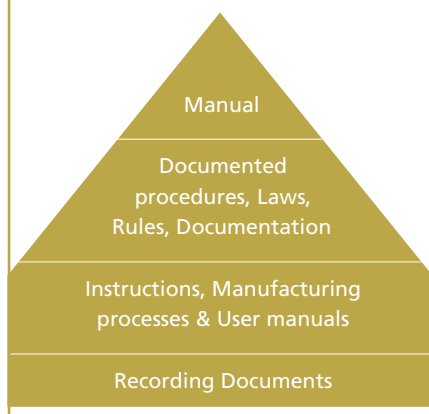
## Lameco laminated shims

### QUALITY

our primary objective

LAMECO's activity is based on a Quality System that is in perpetual improvement.

It is formalised as following:



Our customers can be provided with our **QUALITY MANUAL** on justified demand.

### LAMECO KNOW-HOW

The world's leading company for **innovation** and **patents** in the field of laminated shims,

Providing **Technical assistance** in the choice of materials,

Providing **Individual development** to meet special requirements and **feasibility studies** of final products,

Providing exclusive: **Peel-off abilities** adapted to customer requirements,

Providing dedicated **production capacities** due to the constant efforts made by investing in **machinery of increasingly high-performance** adapted by or even custom designed by LAMECO.

At the Customer's request: **unit marking** of parts and **unit packaging or batches of parts**.

### LAMECO references:

#### CERTIFICATIONS

- ISO 9001 (v 2015), valid until March 26th, 2024
- EN 9100 (v 2016), valid until March 26th, 2024

#### QUALIFICATIONS

- NATO (F6688)
- GIFAS member (Aerospace equipment supplier)

#### STANDARDS TO WHICH WE MANUFACTURE - EXAMPLES

ABS1507, ASNA0115, CMS-MT-301, BACS40R, BACS40V, BACS40X, S10249, etc.

#### AGREEMENTS

- Defence
- Space:
  - Launchers
  - Satellites
- Formula 1
- Medical engineering
- Textile engineering
- Production machines and machining units
- Specialized machines
- Aeronautical equipment:
  - Landing gear
  - Aircraft manufacturers
  - Helicopter manufacturers
  - Aircraft engine manufacturers
  - Nacelles
  - Structures
- Scientific and research equipment
- Cryogenic systems



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INTERCOMPOSITE®

# INTERCOMPOSITE

## The composite laminated shim



INTERCOMPOSITE® (1) is a unique designed LAMECO material.

This composite material is made of a polyethylene glycol terephthalate film obtained by a slit-die extrusion process, followed by a double-drawing.

### Advantages:

#### LIGHTNESS

As an answer to a weight saving requirement. INTERCOMPOSITE® is one of the lightest of laminated materials.

Material	Specific weight	Weight-saving
INTERCOMPOSITE®	1.395	
Aluminium	2.8	2.01 X

#### GOOD PHYSICAL, MECHANICAL, THERMIC AND CHEMICAL CHARACTERISTICS

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

#### ANTI-FRETTING

INTERCOMPOSITE® is a total barrier against the galvanic coupling caused by surface contact of different metallic alloys. No further surface treatment is required.

#### ADAPTATION TO CURVED SHAPES

INTERCOMPOSITE® has the property to immediately adapt itself to most curves profiles without any loss of precision. And this can be performed in site.

#### FACILITY AND RAPIDITY OF USE

You can peel INTERCOMPOSITE® with your forefinger (no tools being necessary) and once peeled the sheets are reusable.

(1) INTERCOMPOSITE® - Trademark registered, France: Patent No. FR 2 572 411 B1

(2) DUOPEEL® - Trademark registered, see patent numbers on the sheet devoted to this product.

# INTERCOMPOSITE

The composite laminated shim

## SAFETY

INTERCOMPOSITE® is easily peeled without risk of finger cuts.

## Low cost

INTERCOMPOSITE® (as well as DUOPEEL®(2)) is the least expensive of all our laminated materials.

## SMART AND ECONOMICAL

Once peeled, the sheets remain flat and show no signs of deformation. They can thus be re-used and can serve as single-unit shimming parts.

## Dimensions of INTERCOMPOSITE® products:

Standard	Specific weight	Thickness of laminations (mm / inch)							
		Standard							
		0.012 / .0005	0.019 / .0007	0.023 / .0009	0.025 / .001	0.05 / .002	0.075 / .003	0.1 / .004	0.2 / .008
		3	4	5	6	7	8	9	11
LS12	1.395	x	x	x	x	x	x	x	x

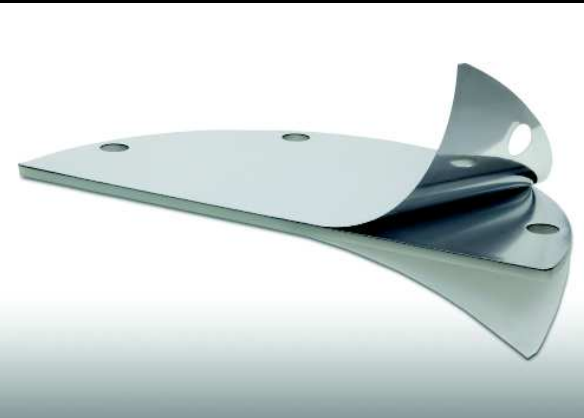


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# DUOPEEL

## The visual bilaminate



DUOPEEL<sup>®</sup> (1) is a peel-off material designed(2) by LAMECO. This bi-laminated composite material allows the different thicknesses of its laminated component parts to be easily differentiated. This is because the thinnest sheets have received a specific treatment identifiable to the naked eye: a layer of aluminium atoms covers the polyester, giving the latter a metallic appearance. The thickest sheets, however, are in single-colour polymer, thus allowing identification of the different laminated parts of your finished product. You can thus peel off the appropriate side to obtain the exact shim thickness you require.

### Advantages:

#### EASY IDENTIFICATION OF THE DIFFERENT PEELABLE SECTIONS

For example, a laminated shim with a total thickness of 1.75 mm/.069 inch can be made of one section of 20 single-colour polyethylene glycol terephthalate parts – for the greater unit thickness - of 0.075 mm/.003 inch each (i.e. a subtotal of 1.50 mm/.06 inch) and of a second section of 10 sheets of metallised polyester – for the thinner unit thickness - of 0.025 mm/.001 inch each (i.e. a subtotal of 0.25 mm/.01 inch).

#### LIGHTNESS

It is an appropriate response to a requirement for lighter materials (to achieve greater autonomy or payload). DUOPEEL<sup>®</sup> is, with INTERCOMPOSITE<sup>®</sup> (2), DUOPEEL<sup>®</sup> (3), X.FIBER<sup>®</sup> (4), X.FIBER HIGH-DENSITY<sup>®</sup> (5) and COBRA.X<sup>®</sup> (6) one of the lightest of all our peel-off materials.

Material	Specific weight	Weight-saving
DUOPEEL <sup>®</sup>	1.395	
Aluminium	2.8	2.01 X

#### ADAPTS TO CURVED SHAPES

DUOPEEL<sup>®</sup> immediately adapts to most curves without any loss of precision. And all this at the assembly site itself.

#### EASE AND SPEED OF USE

DUOPEEL<sup>®</sup> can be peeled by finger, there's no need for tools.

(1) DUOPEEL<sup>®</sup> - Trademark registered,

(2) France: Patent No. FR 2 944 990 B1, Europe: Patent No. EP 2 248 661 B1

(3) INTERCOMPOSITE<sup>®</sup>, (4) DUOPEEL<sup>®</sup>, (5) X.FIBER<sup>®</sup>, (6) X.FIBER HIGH-DENSITY<sup>®</sup>, (7) COBRA.X<sup>®</sup> - Trademarks registered, see patent numbers on the sheet devoted to each of these products.

# DUOPEEL

The visual bilaminate

## SAFETY, NO RISK OF OCCUPATIONAL ACCIDENTS

This composite material removes any risk of injury during the peeling operation.

## GOOD PHYSICAL, MECHANICAL, THERMAL AND CHEMICAL CHARACTERISTICS

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

## SAVINGS AND ECONOMY

Once peeled, the sheets remain flat and show no signs of deformation. And so they are reusable.

## Dimensions of DUOPEEL® products:

Standard	Specific weight	Thickness of lamination (mm / inch)											
		Standard								Metallised polyester			
		PET											
		0.012	0.019	0.023	0.025	0.05	0.075	0.1	0.2	0.012	0.019	0.023	0.05
		.0005	.0007	.0009	.001	.002	.003	.004	.008	.0005	.0007	.0009	.002
		3	4	5	6	7	8	9	11	3	4	5	7
LS12	1.395	x	x	x	x	x	x	x	x				
LS13	1.395									x	x	x	x

DUOPEEL®, synergy  
for assemblers and technicians



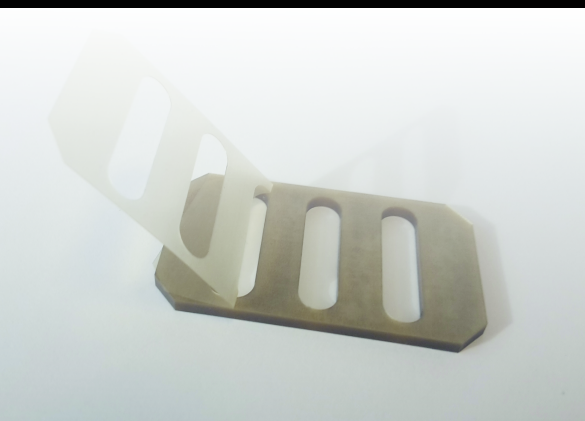
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# PEEKPEEL

## The composite with high thermal resistance



PEEKPEEL<sup>®</sup> (1) is a laminated composite material designed by LAMECO.

This composite material, the PolyEtherEtherKetone, takes the form of an uncharged polymer-based semi-crystalline film.

It offers a large number of outstanding properties, the main one being its high thermal resistance.

### Advantages:

#### ENDURANCE

PEEKPEEL<sup>®</sup> boasts a high thermal resistance. The mechanical properties of this product are not affected by temperature rise. It can thus be exposed without damage to temperatures of more than 250 °C/482 °F.

#### LIGHTNESS

An appropriate response to a need for lighter materials (for increased autonomy, payload, etc.). PEEKPEEL<sup>®</sup> is, with INTERCOMPOSITE<sup>®</sup> (2), DUOPEEL<sup>®</sup> (3), X.FIBER<sup>®</sup> (4), X.FIBER HIGH-DENSITY<sup>®</sup> (5) and COBRA.X<sup>®</sup> (6) one of the lightest of all our peel-off materials.

Material	Specific weight	Weight-saving
PEEKPEEL <sup>®</sup>	1.3	
Aluminium	2.8	2.15 X

#### OUTSTANDING PHYSICAL, MECHANICAL, THERMAL AND CHEMICAL CHARACTERISTICS

These data will be communicated on request, by return of e-mail.

#### ANTI-FRETTING

PEEKPEEL<sup>®</sup> provides a total barrier to the galvanic coupling caused by contact of different metal alloys. It thus requires no surface treatment.

(1) PEEKPEEL<sup>®</sup> - Trademark registered, France : Patent pending

(2) INTERCOMPOSITE<sup>®</sup>, (3) DUOPEEL<sup>®</sup>, (4) X.FIBER<sup>®</sup>, (5) X.FIBER HIGH-DENSITY<sup>®</sup>, (6) COBRA.X<sup>®</sup> - Trademarks registered, see patent numbers on the sheet devoted to each of these products.

# PEEKPEEL

The composite with high thermal resistance

## ADAPTATION ON CURVED SHAPES

PEEKPEEL® adapts immediately to most curves without loss of accuracy. And, what's more, on the actual assembly site.

## QUICK AND EASY TO USE

PEEKPEEL® peels off "using your finger", no need for tools.

## SAFE TO USE

The PEEKPEEL® Laminated Shims can be handled without risk of cutting yourself.

## SMART AND ECONOMICAL

Once peeled, the sheets remain flat and show no signs of deformation. They can thus be re-used and can serve as single-unit shimming parts.

## Dimensions of PEEKPEEL® products:

Standard	Specific weight	Thickness of laminations (mm / inch)								
		Standard								
		0.012 / .0005	0.019 / .0007	0.023 / .0009	0.025 / .001	0.05 / .002	0.075 / .003	0.1 / .004	0.2 / .008	
		3	4	5	6	7	8	9	11	
LS22	1.3	x	x	x	x	x	x	x	x	x



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# X.FIBER

## The high-resistance composite material



X.FIBER<sup>®</sup> (1) (2) is a designed composite product, which is truly innovative in the field of laminated shims. This composite material comes in the form of woven fiber sheets, which can be manufactured in several different ways - these fibers can be of the following materials: glass, carbon, aramide, ceramic fibers or a combination of two or more of these different fibers. The sheets are held together by a heat-hardened resin, the resulting material delivers both very high technical performance and excellent peelability.

### Advantages:

#### LIGHTNESS

It is an appropriate response to a requirement for lighter materials (to achieve greater autonomy or payload). X.FIBER<sup>®</sup> is, with INTERCOMPOSITE<sup>®</sup> (3) and DUOPEEL<sup>®</sup> (4), one of the lightest of all our peel-off materials (up to eight times lighter in weight than steels or brass!).

Material	Specific weight	Weight-saving	
		X.FIBER-Glass	X.FIBER-Carbon
X.FIBER-Carbon	1.05		
X.FIBER-Glass	1.35		1.29 X
Stainless steel	8.2	6.07 X	7.81 X
Brass	8.5	6.30 X	8.10 X

#### STRENGTH

Being both lighter and stronger, X.FIBER<sup>®</sup> can be used to great advantage as a replacement for carbon and stainless steels.

#### RESISTANCE

X.FIBER<sup>®</sup> mechanical properties remain unaffected by the rise in temperature. Thus this product can be exposed without damage to heat exceeding 1,472 °F (800 °C). Note that the 572 °F (300 °C) limit for the binder is by no means restrictive: beyond this limit, it is destroyed, but the part retains its optimal quality. Its mechanical properties are comparable with peelable metals.

(1) X.FIBER<sup>®</sup> — Trademark registered,

(2) Europe: Patent No. EP 1 444 094 B1,  
Canada: Patent No. CA 2 464 337 C,  
USA: Patent No. US 8 518 839 B2.

(3) INTERCOMPOSITE<sup>®</sup>, (4) DUOPEEL<sup>®</sup> -  
Trademarks registered, see patent numbers on  
the sheet devoted to each of these products.

# X.FIBER

The high-resistance composite material

## ANTI-FRETTING

X.FIBER® is a total barrier against the galvanic coupling caused by surface contact of different metallic alloys. No further surface treatment is required.

## RAPIDITY

The sheets can be peeled by hand, without the need for tools of any kind.

## SAFE TO USE

The X.FIBER® Laminated Shims can be handled without risk of cutting yourself.

## INGENUITY AND ECONOMY

Once they have been peeled, the sheets remain flat and free of deformation. They remain fully re-useable.

## Dimensions of X.FIBER® products:

Standard	Specific weight	Thickness of laminations (mm / inch)			
		Standard			
		0.05 / .002	0.075 / .003	0.1 / .004	0.11 / .0043
		7	8	9	10
X.FIBER-Glass					
LS16*	1.35	X			
	1.37		X		
	1.39			X	
X.FIBER-Carbon					
LS15*	1.05				X

\*LS14 has been superseded



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# X.FIBER HIGH-DENSITY

## The high-performance composite material



X.FIBER HIGH-DENSITY<sup>® (1)</sup> is a laminated material designed<sup>(2)</sup> by LAMECO. This composite material takes the form of a multitude of woven fibreglass sheets. The sheets are interlinked by a thermosetting resin, the elaboration of which bestows on the resulting final material outstanding technical performances and excellent peelability.

### Advantages:

#### LIGHTNESS

It is an appropriate response to a requirement for lighter materials (to achieve greater autonomy or payload). X.FIBER HIGH-DENSITY<sup>®</sup> is, with INTERCOMPOSITE<sup>® (3)</sup> and DUOPEEL<sup>® (4)</sup>, one of the lightest of all our peel-off materials (up to six times lighter in weight than steels or brass!).

Material	Specific weight	Weight-saving
		X.FIBER HIGH-DENSITY
X.FIBER HIGH-DENSITY <sup>®</sup>	1.35	
Stainless steel	8.2	6.07 X
Brass	8.5	6.30 X

#### ROBUSTNESS

In addition to being a lightweight product, X.FIBER HIGH-DENSITY<sup>®</sup> is also extremely robust. Indeed it is resistant to:

- very high compressive forces, without entanglement,
- chemical attacks,
- water,
- sea air.

As such, it is an excellent substitute for stainless steels.

(1) X.FIBER HIGH-DENSITY<sup>®</sup> — Trademark registered,

(2) Europe: Patent pending, Canada: Patent pending, États-Unis: Patent pending.

(3) INTERCOMPOSITE<sup>®</sup>, (4) DUOPEEL<sup>®</sup> - Trademarks registered, see patent numbers on the sheet devoted to each of these products.

# X.FIBER HIGH-DENSITY

The high-performance composite material

## RESISTANCE

X.FIBER HIGH-DENSITY® mechanical properties remain unaffected by the rise in temperature. Thus this product can be exposed without damage to heat exceeding 932 °F (500 °C).

## RAPIDITY

The sheets can be peeled by hand, without the need for tools of any kind. This composite material removes any risk of injury during the peeling operation.

## INGENUITY AND ECONOMY

Once they have been peeled, the sheets remain flat and free of deformation. They remain fully re-useable.

## ANTI-FRETTING

X.FIBER HIGH-DENSITY® is a total barrier against the galvanic coupling caused by surface contact of different metallic alloys. No further surface treatment is required.

Dimensions of X.FIBER HIGH-DENSITY® products:

Standard	Specific weight	Thickness of laminations (mm / inch)	
		Standard	
		0.1 / .004	
		9	
LS21	1.35		X



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# CURVPEEL

## The ergonomic curved shim



CURVPEEL<sup>®</sup> (1) is an exclusive process, designed (2) by LAMECO.

It provides a top-quality solution for laminated shims with curved shapes, where the required curve radius is incorporated into the shim during production.

### Benefits:

#### OPTIMAL ERGONOMICS

The process is applied to shims intended for use on cylindrical couplings: these shims will then create a perfect fit for the curved configuration sets that are specific to certain assemblies. Cowlings, wind-turbine housings, fuselages, body-work, transmission shaft guides, etc. are examples of this use.

With the CURVPEEL<sup>®</sup> process, many different types of parts can be positioned and adjusted on curved bodies without any extra fitting being required. Probes, antennae, rear-view mirrors, motors, stabilizers, pump bodies, reduction gear bodies, etc. are all possible examples.

#### VERY HIGH PRECISION

With the CURVPEEL<sup>®</sup> manufacturing process, highly accurate curved shims can be obtained with one or more constant radii.

#### A GAIN IN TIME AND A FINANCIAL BENEFIT

The shim no longer needs to be shaped before being assembled: It is delivered ready-to-use. This advantage is all the more appreciable where thick metallic laminated shims are required, as they cannot be curved manually or even with special tooling just before they are assembled. Furthermore, the CURVPEEL<sup>®</sup> process avoids any risk of delaminating and/or breaking laminations that can be found when shims are shaped at the last moment.

This results in avoiding running the risk of considerable losses of time and a reject ratio that may often prove to be prohibitive.

(1) CURVPEEL<sup>®</sup> - Registered trademark,

(2) France: Patent No FR 1 355 565 B1, Europe: Patent pending, Canada: Patent pending, US: Patent pending

# CURVPEEL

The ergonomic curved shim

## LAMECO'S SPECIALTY: IMPECCABLE QUALITY

Our laminated shims are composed of foils glued across the entire face and not just at the edge.

In addition, due to our exclusive production processes they are perfectly parallel and totally free of any burrs.

## Product dimensions in the CURVPEEL® range:

SPECIFICATION / MATERIAL	SPECIFIC WEIGHT	THICKNESS OF PEELABLE ELEMENTS (IN MM/INCH)									
		SPECIFICATION									
		0.010 .0004	0.012 .0005	0.019 .0007	0.023 .0009	0.025 .001	0.05 .002	0.075 .003	0.1 .004	0.11 .0043	0.2 .008
		2	3	4	5	6	7	8	9	10	11
<b>Aluminium</b>											
CPLS1	1200	2.8					X	X			
CPLS2	5052	2.8					X	X			
CPLS18	1050	2.8					X		X		X
CPLS19	1100	2.71					X	X			
<b>Brass</b>											
CPLS3	CuZn37	8.5				X	X	X	X		
<b>Stainless steel</b>											
CPLS4	Z 10CN 18.09/AISI 302	8.2					X	X	X		
CPLS5	Z 6CN 18.10/AISI 304	8.2	X			X	X	X	X		
CPLS6	Z 2CN 18.10/AISI 304L	8.2					X	X	X		
CPLS7	AISI 316	8.2					X	X			
CPLS8	Z 2CND 17.12/AISI 316L	8.2					X	X	X		
<b>Mild steel</b>											
CPLS9	C1010	7.85					X		X		
CPLS23	DC04	7.85				X					
<b>Titanium</b>											
CPLS10	Grade 1 (T35)	4.5				X	X	X	X		
CPLS11	Grade 2 (T40)	4.5					X	X	X		
<b>INTERCOMPOSITE®</b>											
CPLS12	(polymer/époxy/polyester)	1.395	X	X	X	X	X	X	X		X
<b>DUOPEEL®</b>											
CPLS13	(metallised polyester)	1.395	X	X	X		X				
<b>X.FIBER®</b>											
CPLS15	(carbon fabric)	1.05								X	
CPLS16	(PLUS glass fabric)	1.35 to 1.39					X	X	X		



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# PEELSTICK

## The self-adhesive laminated shim



A double-sided sticker is applied to one of the sides of the PEELSTICK® laminated shim<sup>(1)</sup>. Then you only have to remove the protective sheet to stick the shim exactly where thickness adjustment or shimming is required. The double side offers final high adhesive strength and good environmental resistance performances.

### Advantages:

#### QUICK AND EASY TO USE

#### THE SHIM STAYS IN PLACE ON ITS OWN

The sticker allows the shim to be stuck in places where screws were previously needed to hold it in place on assembling – for example vertically.

#### WHEN IT IS PREFERABLE NOT TO USE SCREWS

The PEELSTICK® laminated shim offers a solution when screw-fastening is neither desirable nor feasible.

#### LONG-TERM ADHESION EVOLUTION

The adhesive strength of the sticker increases as a function of time and temperature. In some cases, the weak initial adhesion will allow the shim to be repositioned if necessary, whereas final adhesion will be very strong.

#### GOOD TEMPERATURE RESISTANCE

The acrylic adhesive can be used for short periods (hours, minutes) at temperatures of up to 204 °C/399.2 °F, as well as for longer intermittent periods (a few days or weeks) up to 149 °C/300.2 °F. Once applied, the adhesive can withstand temperatures as low as -40 °C/-104 °F.

(1) PEELSTICK® - Registered trademark,

(2) Europe: Patent pending, Canada: Patent pending, USA: Patent pending

# PEELSTICK

The self-adhesive laminated shim

## EXCELLENT CHEMICAL RESISTANCE

The adhesive in our PEELSTICK® range offers excellent resistance to solvents and very good tolerance to exposure to a large number of chemicals. These include for example petrol, oil, "freon" TF, sodium chloride solution, weak acids and bases.

## EXCELLENT MOISTURE RESISTANCE

High-moisture conditions have minimum impact on the adhesive performances of the double-sided sticker. Holding power is normally greater after a 7-day exposure at 32 °C/89.6 °F and 90% relative humidity.

Moreover, the polyethylene-coated kraft paper protector remains stable in damp conditions.

## WATER RESISTANCE

Immersion in water has no significant effect on holding power. Immersion in water at room temperature for 100 hours actually shows an increase in holding power.

## PEELSTICK® range of products:

PEELSTICK® is available in all our peel-off materials.

To refer to it as per our standard, just add "PST" in front of the material in "LS" - for example PSTLS12 will refer to the single-colour polymer to which the high-performance double-sided adhesive will be applied.

This adhesive comes in a thickness of 0.050 mm/.002 inch or 0.125 mm/.005 inch. The 0.050 mm/.002 inch thickness is recommended for bonding on smooth surfaces, whereas the 0.125 mm/.005 inch thickness is more suited for applications on rough or textured surfaces.



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# INSTANT-PEEL

## Metal as easy to peel as composite



INSTANT-PEEL<sup>®(1)</sup> is a range of peelable metal materials, designed<sup>(2)</sup> by LAMECO. For the first time, metallic shims are as easy and quick to use as shims made with composites.

### Advantages:

#### EASE OF PEELING AND RAPIDITY OF USE

Peelable metallic materials in the INSTANT-PEEL<sup>®</sup> range can be peeled off just as easily as our peelable composites (INTERCOMPOSITE<sup>®(3)</sup>, DUOPEEL<sup>®(4)</sup>, X.FIBER<sup>®(5)</sup>, X.FIBER HIGH-DENSITY<sup>®(6)</sup> and COBRA.X<sup>®(7)</sup>). The leaves can be removed "with your fingers" without any need for a tool, a scalpel or a cutter, which makes life considerably easier for fitters and technicians.

This ease of use is totally new in the world of metallic shims and is a revolutionary innovation.

#### SAFETY, NO RISKS OF ACCIDENT

This range of materials eliminates all risks of cutting yourself when peeling the shim. Therefore, there is no need to wear protective gloves; it has never been easier to handle metal leaves.

#### THE METAL'S GOOD PHYSICAL, MECHANICAL, THERMAL AND CHEMICAL CHARACTERISTICS ARE PRESERVED

Detailed data will be supplied on request, by return of e-mail.

#### INTELLIGENT AND ECONOMICAL

Once peeled, leaves stay flat and are not deformed in any way. Therefore they can be reused.

This quality also proves to be a considerable innovation in the world of metallic shims.

(1) INSTANT-PEEL<sup>®</sup> - Registered trademark,

(2) Europe: Patent No EP 2 849 938 B1, USA : Patent No US 9,381,725 B

(3) INTERCOMPOSITE<sup>®</sup>, (4) DUOPEEL<sup>®</sup>, (5) X.FIBER<sup>®</sup>, (6) X.FIBER HIGH-DENSITY<sup>®</sup>, (7) COBRA.X<sup>®</sup> - Trademarks registered, see patent numbers on the sheet devoted to each of these products.

# INSTANT-PEEL

Metal as easy to peel as composite

## THE LAMECO SPECIALITY: IMPECCABLE QUALITY

Each individual layer of the laminated shims in our INSTANT-PEEL® range is bonded to the next across its entire surface and not just at the edges. Furthermore, thanks to our proprietary production processes, they are perfectly flat and entirely devoid of burrs.

Dimensions of products in the INSTANT-PEEL® range:

SPECIFICATION / MATERIAL	SPECIFIC WEIGHT	THICKNESS OF PEELABLE ELEMENTS (MM / INCH) SPECIFICATION					
		0.010 .0004	0.025 .001	0.05 .002	0.075 .003	0.1 .004	
		2	6	7	8	9	
<b>Brass</b>							
IPLS3	CZ108/CuZn37	8.5		X	X	X	X
<b>Stainless steel</b>							
IPLS4	304S31/AISI 302	8.2			X	X	X
IPLS5	304S15/AISI 304 304S16/AISI 304	8.2	X	X	X	X	X
IPLS6	304S11/AISI 304L	8.2			X	X	X
IPLS7	316S16/AISI 316 316S33/AISI 316	8.2			X	X	
IPLS8	316S12/AISI 316L 316S13/AISI 316L	8.2			X	X	X
<b>Mild steel</b>							
IPLS9	C1010	7.85			X		X
IPLS23	DC04	7.85		X			
<b>Titanium</b>							
IPLS10	2TA1/Ti Gr1	4.5		X	X	X	X
IPLS11	TA2/Ti Gr2	4.5			X	X	X

INSTANT-PEEL®, metal as easy to use as composite



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# SILENTLINE

## Noise abatement laminated shims



Any mechanical assembly in working order generates vibrations that are source of harmful frequencies. As a solution to this critical drawback, LAMECO<sup>(1) + (2)</sup> offers an innovative laminated product called SILENTLINE<sup>®</sup>. SILENTLINE<sup>®</sup> is a composite of metal and synthetic material, which has the key advantage of spreading the vibrational energy over a dramatically wider band (lower Q factor) - therefore dampening the transmission of potentially destructive harmful frequencies.

### Advantages:

#### IMPROVED MECHANICAL CHARACTERISTICS

The mechanical characteristics of laminated shims are improved with this material. CETIM tested two probes, both in 0.08 inch / 2 mm thickness:

- The first one, of conventional form, entirely consisting of peelable metal foils: achieved Vickers value = 440 MPa
- The second one manufactured in the new material: achieved Vickers value = 510 MPa.

#### REDUCED WEAR AND TEAR

The SILENTLINE<sup>®</sup> laminated shims improve the operation of systems and machines which thus require less maintenance and are less subject to wear.

#### GREEN PRODUCT

- This product contributes to improvements of the working environment, of benefit to all users
- It makes it easier to achieve the demands of noise abatement legislation.

#### COMPETITIVE PRICE

The cost of SILENTLINE<sup>®</sup> laminated shims is virtually equivalent to that of shims made of other laminated Materials. So there is no economic obstacle to their use.

(1) SILENTLINE<sup>®</sup> - Trademark registered

(2) Europe: Patent No EP 0 667 233 B1

# SILENTLINE

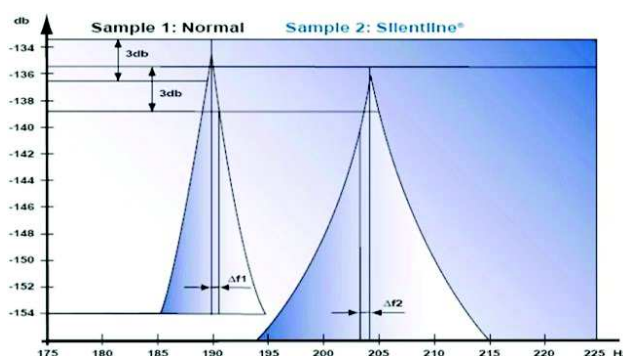
Noise abatement laminated shims

## Performances of SILENTLINE® laminated shims:

Tests carried out by CETIM on this new materiel show its capacity to tone down – in a spectacular way – the two consequences of a harmful frequency emission:

- Absorption or dampening and dispersion of 45 to 50 % of the **amplitude**;
- Reduction by 50 to 55 % of the **emission duration**.

This is therefore a high performance material.



## Dimensions of SILENTLINE® products:

Specification / Material	Specific weight	Thickness of laminations (mm / inch)					
		Specification					
		0.010 / .0004	0.025 / .001	0.05 / .002	0.075 / .003	0.1 / .004	
		2	6	7	8	9	
<b>Stainless steel</b>							
SLS4	Z 10CN 18.09/AISI 302	8.2			X	X	X
SLS5	Z 6CN 18.10/AISI 304	8.2	X	X	X	X	X
SLS6	Z 2CN 18.10/AISI 304L	8.2			X	X	X
SLS7	AISI 316	8.2			X	X	
SLS8	Z 2CND 17.12/AISI 316L	8.2			X	X	X
<b>Steel</b>							
SLS9	C1010	7.85			X		X
SLS23	DC04	7.85		X			

# LAMECO

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# Qar.X DATA-SHIM

## The shim with built-in memory



LAMECO is the first to incorporate an electronic identifier inside the laminated shim, allowing it to communicate.  
 Principle: a chip is inserted within the shim's layers. Next, the chip is encoded with the shim's identity.  
 From that moment on, the information contained in the chip can be deciphered by a hand-held reader.

### SECURITY

The electronic identifier is not rewritable: information regarding the Qar.X DATA-SHIM<sup>® (1+2)</sup> cannot be falsified.

- It is **physically inviolable**: any attempt to extract the chip will cause it to self-destruct.
- It **solves the problem inherent in stamp-marking**: the shim's identification disappears with its top layer, as many leaves as desired may be peeled, without risking the loss of their identifying data.

The electronic identifier provides protection against collision with other chips that could be present in the system.

### FLEXIBILITY

The electronic identifier can be remote-read:

- When the Qar.X DATA-SHIM<sup>®</sup> is installed;
- When the equipment in which it is located is in service.

### SIMPLIFICATION

Assembly as well as maintenance are simplified. As a matter of fact, a general reader makes it possible to identify all Qar.X DATA-SHIM<sup>®</sup> present in a unit of equipment.

Thus one ascertains that:

- The correct number of LAMECO laminated shims is installed;
- Each one of these is properly placed;
- The list of parts to be ordered is accurate and complete.

(1) QAR.X DATA-SHIM<sup>®</sup> — Trademark registered.

(2) Europe: Patent No. EP 1 615 764 B1,  
 Canada: Patent No CA 2 522 861 C,  
 USA: Patent pending.

# Qar.X DATA-SHIM

The shim with built-in memory

## SHIMS IN QUESTION

The electronic identifier can improve all your shims in composite material - INTERCOMPOSITE®, X.FIBER®, DUOPEEL®, X.FIBER HIGH-DENSITY®, PEEKPEEL®, the CURVPEEL® range in composite - from a minimum total thickness of 2 mm/.079 inch.

## TRACEABILITY & PAPERLESS DOCUMENTATION

If you wish, in addition to each part's identity, we are able to record on the chip its entire traceability.

Paperless documentation, such as the Delivery Order, Inspection Report, Statement of Conformity, becomes a reality.

Thus, inspection, acceptance, storage operations are made easier, and any danger of documents loss is averted.



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# OUR COMMERCIAL PRESENCE WORLDWIDE



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