tertu EQUIPEMENTS

Edition : 01/09/2021
Review n°2

Installation Manual

STEEL BACKED TIMBER GUARDRAIL

Model T22 4MS2

posts every 2.00 m

CE n° 1826 CPR 09 02 06 DR7

Containment Level	Working Width (Wn)	Dynamic deflection (Dn)	Impact Severity Level (ASI)
N2	W4 - 1.30 m	1.00 m	A

CE

1826

TERTU SAS - FR 61160 VILLEDIEU LES BAILLEUL

1826-CPR-09-02-06-DR7

EN 1317

Wood-steel barrier simple beam (posts every 2 metres) to be used in circulation areas

Guardrail type T22 4MS2

Performance under impact :

a) Containment level : N2

b) Impact severity level : A

c) Working width : Wn = 1.30 m **(W4)**

d) Maximum dynamic deflection : Dn =1.00 m

Durability :

S235 JR galvanised according to EN ISO 1461
S280 GD 600 pre-galvanised according to EN 10 346
Wood treated according to EN EN 335

Dangerous substance : None

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1- Introduction

This manual is only dedicated to the installation of the **T22 4MS2 steel backed timber guardrail**, made by the French company Tertu. It has been written on the basis of technical data collected during the designing of the guardrail, the crash-tests performed according to EN1317-2 standard as well as several operating feedbacks.

2- Traceability, components marking

Except the hardware, every single steel component is identified with a marking: Tertu logo (except C100 post), manufacture stamp,batch number and CE official logo.
In case of repair work on the guardrail, it's compulsory to replace damaged parts by/with original components provided by Tertu in order to avoid any risk of modifications which could weaken the performances of the restraint system.

3 - Recommended tools

Non-exhaustive list for the installation :

- Post driving machine adapted to suit C100 profile post
- Impact wrench 24 mm
- Torque wrench
- Socket extension tool
- Measuring tape
- Sledge hammer
- Shovel
- Spanners
- Compressor
- Lorry mounted lifting arm
- TOP400 : Tertu's Help to Guardrail Installation tool

4 - Packaging

Rails are delivered by packets of 12 units. Weight/pallet : 720 kg
Wooden spacers packed on pallets of 84 units. Weight/pallet : 756 kg
Steel components are counted and packed on pallet

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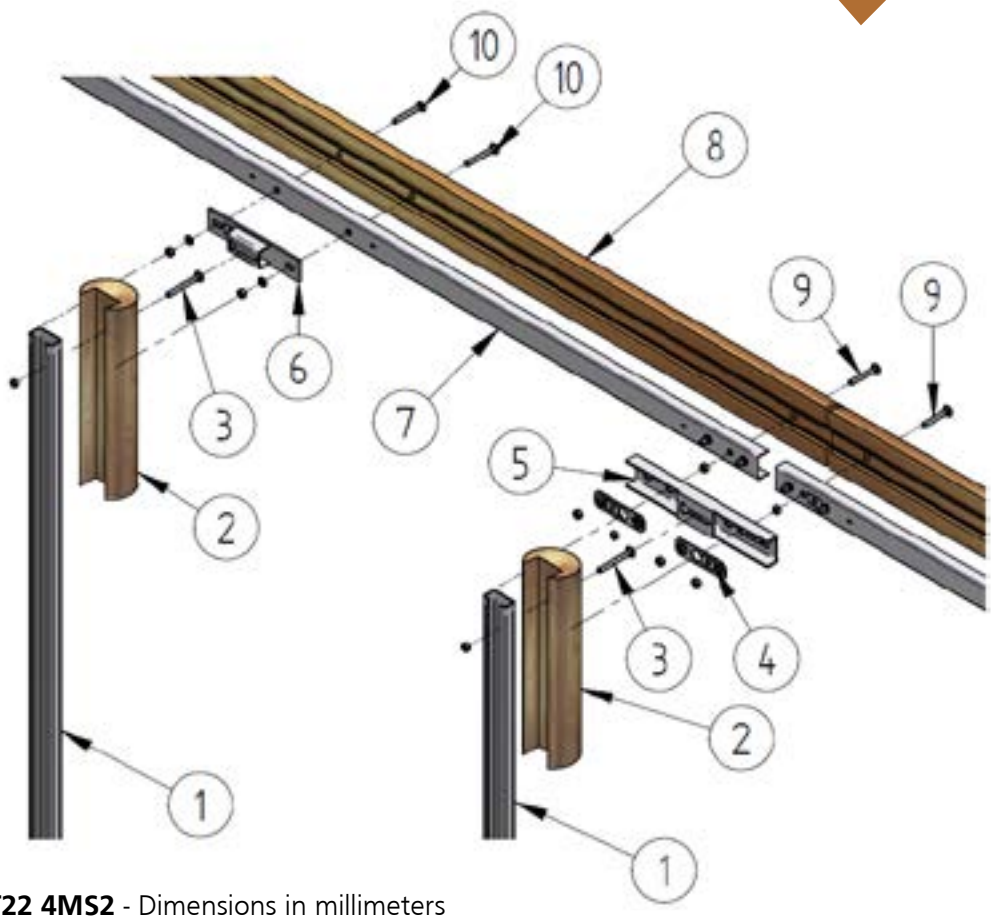
5- Bill of materials



Bill of materials for **4 meters of T22 4MS2** - Dimensions in millimeters

	Item	Code	Description	Qty	Weight/U
1	**Steel post**	C100150	Post C100x50x25x5 - Length = 1500	2	12.80 kg
2	**Wooden spacer**	ECARTC100075	Spacer Ø180 pre-drilled with notch, length : 730	2	9.00 kg
3	**Bolt TRCC 16*140** **Nut M16**	TRCC16140GALVA ECROUM16GALVA	Class 5.8 Class 5	2	0.22 kg
4	**Reinforcing fishplate TL22**	TL22	Structural steel 60x4, length 220	2	0.33 kg
5	**Connecting fishplate**	U62	Structural steel U shape 100*50*7, length 620 1 steel fuse box welded	1	6.00 kg
6	**Intermediate fishplate**	TL5	Structural steel 80x10, length 400 1 steel fuse box welded	1	4.00 kg
7	**Beam**	T22PRM4M	Includes 1/2 pressure treated log Ø220 ; length : 3980 with 4 holes **(8)** 1 steel U channel U90x45x4, length : 3920 with 4 bolts welded to the U profile **(7)**	1	60 kg
8					
9	**Bolt TRCC 16*110** **Nut M16**	TRCC16110GALVA ECROUM16GALVA	Class 5.8 Class 5	2 premounted	0.25 kg
10	**Bolt TRCC 16*120** **Nut M16** **Washer M16**	TRCC16120GALVA ECROUM16GALVA RONDM16	Class 5.8 Class 5 M16 galvanised washer	1 premounted +1 2	0.27 kg
	Specific elements for 1 end terminal				
	Fishplate for buried terminals	TL41	Structural steel 80x10, length 410	1	2.10 kg
	Bolt TH16*40 **Nut M16**	TH1640GALVA ECROUM16GALVA	Class 5.8 Class 5	1	0.21 kg

Weight : 29.00 kg/lm (with C100 in 1.50 m)

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6- Installation conditions

▶ Soil conditions

Before the installation of the barrier, it is important to check the presence of underground networks which could interfere with posts driving. In case of underground network, installation arrangements could be adapted in accordance with Tertu.

The anchoring system behavior depends on the soil quality. Therefore, it is important to evaluate on site the soil's capacity of resistance which must be adequate to insure the proper anchoring of the crash barriers section. The T22 4MS2 has been tested with 1.50 m long C100 posts. However 2,0 m long posts can be used if necessary, according to the soil conditions evaluated during the ground testing procedure.

▶ Curvatures

Fishplates U62 oblong holes allow to cover a 6° angle between 2 railing devices in the horizontal or vertical plan. Therefore, it is possible to follow easily road horizontal or vertical curvature.
The T22 4MS2 is adapted to follow radii ≥ 25.00 m. For radii < 25.00 m or ≥ 15.00 m, it is recommended to use the T22 2M with 2m rails.

Dd=1.00 m

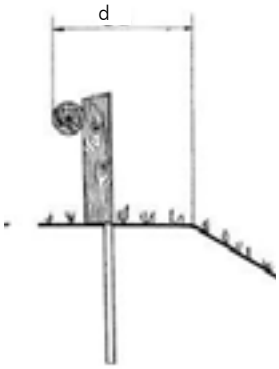


Figure 1

▶ Installation in front of a drop

In case of installation in front of a drop, it is necessary to keep a minimum distance equal to the dynamic deflection (d) of the guardrail mesured between the front of the barrier and the edge of the drop for ensuring the good working of the system (*figure 1*)

▶ Installation in front of an obstacle

In case of installation in front of an obstacle, it is necessary to keep a minimum distance equal to the working width (W) of the guardrail mesured between the front of the barrier and the front of the obstacle for ensuring the good working of the system (*figure 2*)

W=1.30 m

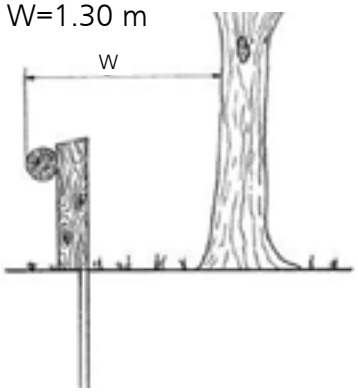
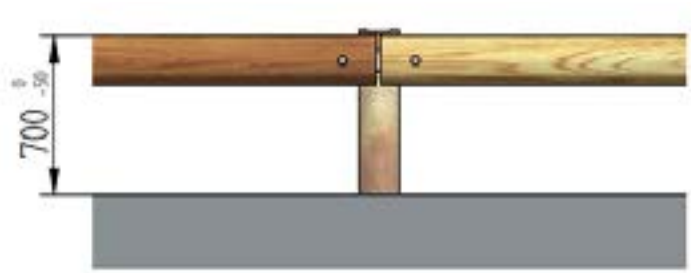


Figure 2

▶ Rail service height

Value and service acceptance : The top-line of the rail face should be **700 mm (+0,-50 mm)** above the average elevation of the road shoulder in a 50 cm wide band in front of the said rail. 55 cm is the highest point between the soil and the rail underneath on the entire linear.



▶ Note

During an impact, components weighing more than 2 kg could came off.

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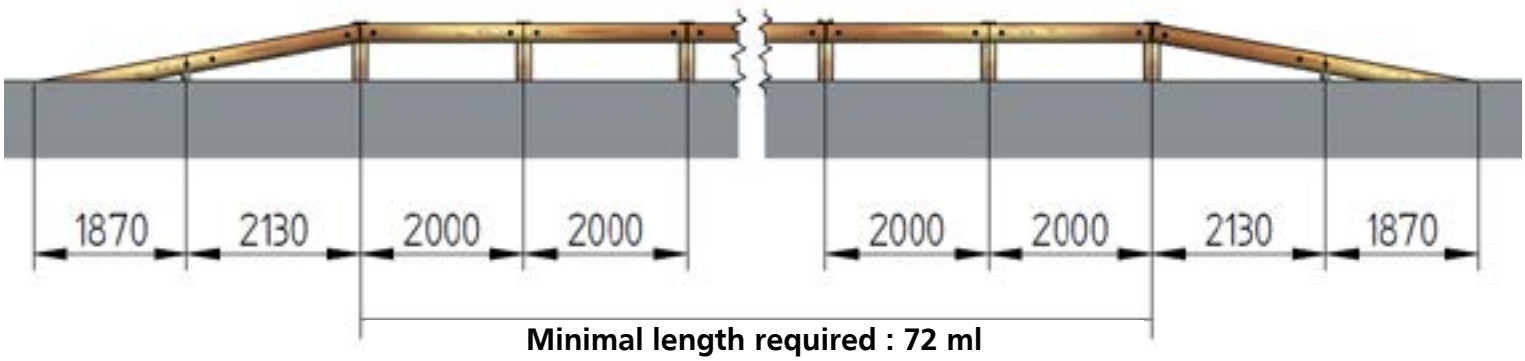
7- Minimal length



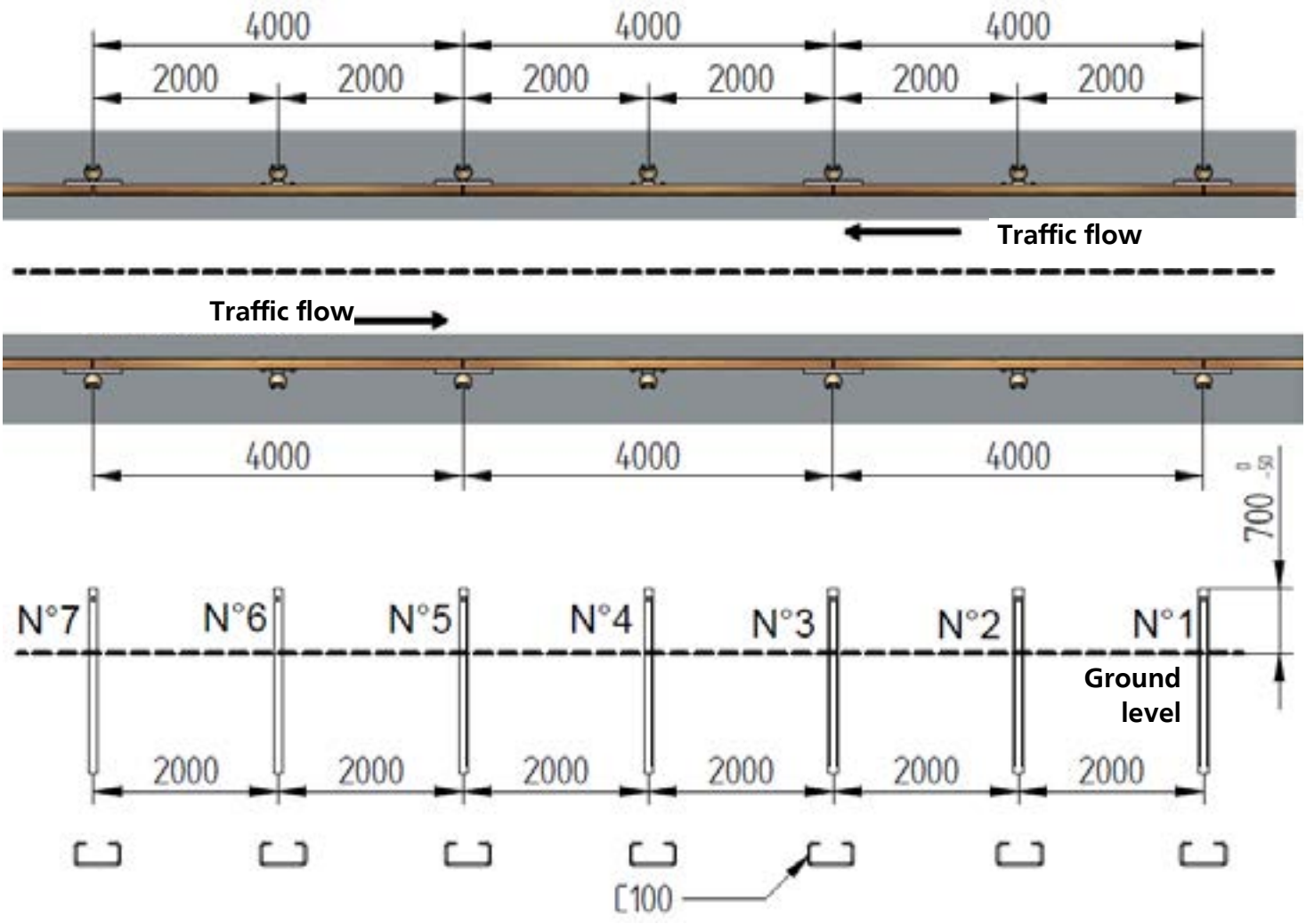
Minimal length required : 72 ml

The minimum recommended length required is **72 lm** in order to assure a proper correct anchorage of the system.
For shorter lengths, it is recommended to contact our Export Department (export@tertu.com) for a prior study.

8- Installation method

STEP 1 - POST INSTALLATION

Posts C100 in 1.50 m length shall be driven into the ground every 2.00 m.
Service height above ground = 720 mm.



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STEP 2 - INSTALLATION OF THE SPACER AND THE U62 FISHPLATE

(Figure n°1)

Once the C100 post installed, place the wooden spacer, then set up the U62 connecting fishplate on the 1st post having previously inserted the TRCC16-140 bolt inside the fuse box and, finally, bolt the complete set onto the C100 posts.

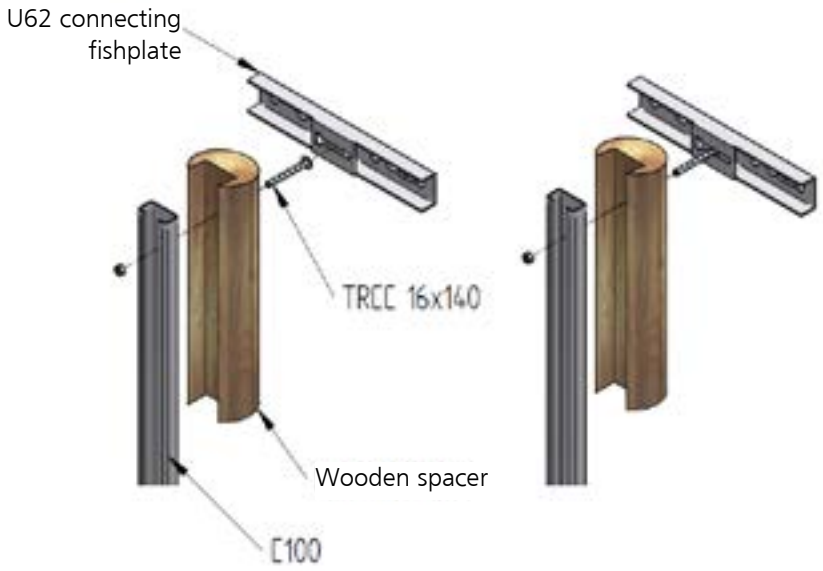

Figure n°1

U62 connecting fishplate

TRCC 16x140

STEP 2 A - INSTALLATION OF TL5 INTERMEDIATE FISHPLATE

(Figure n°2)

Set up TL5 fishplate on the intermediate post having previously inserted the TRCC16-140 bolt inside the fuse box and finally bolt the complete set onto the C100 posts.

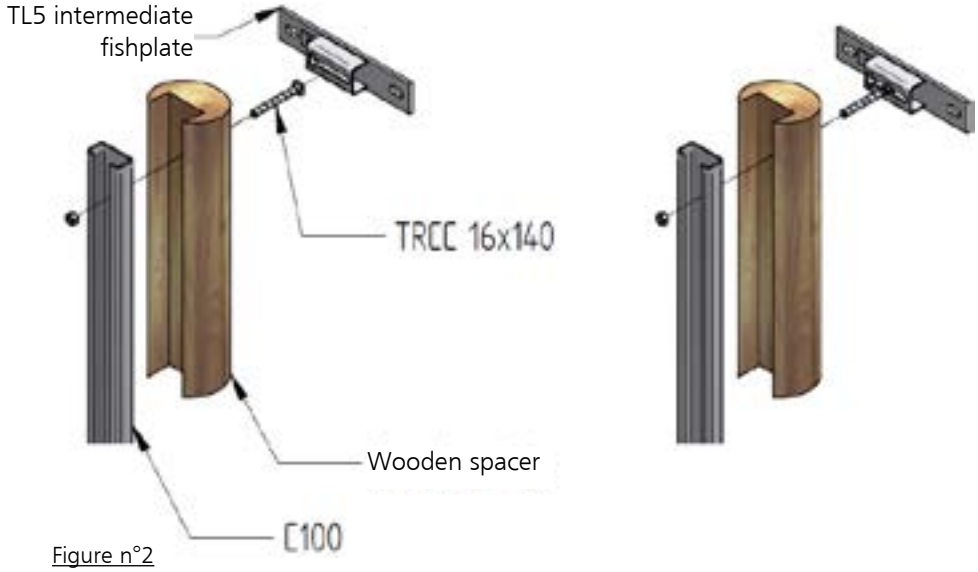

Figure n°2

TL5 intermediate fishplate

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STEP 3 - RAIL T22 INSTALLATION ON U62 CONNECTING FISHPLATE

(Figure n°3)

Place the 4m-rails with the welded bolts facing the fishplate U62, introduce the said bolts inside the fishplate. Then place the 2 reinforcing fishplates TL22 and tighten the complete set with the 4 M16 nuts.

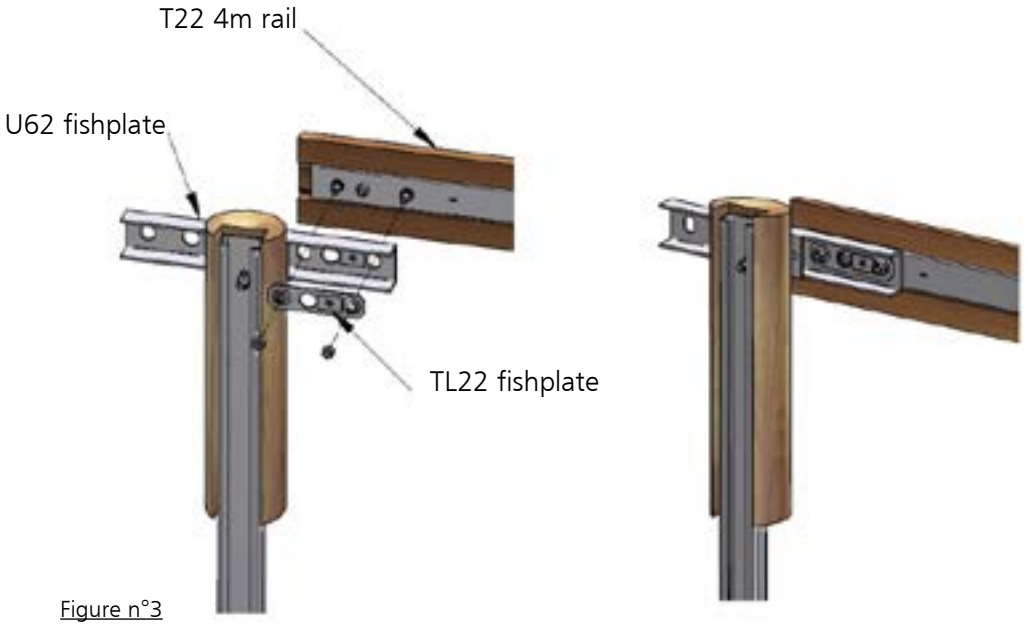

Figure n°3

TL22 fishplate

STEP 3 A - RAIL T22 INSTALLATION ON INTERMEDIATE POST

Introduce the TRCC16-120 welded bolts inside the TL5 fishplate and tighten the complete set with the corresponding nuts and washers.

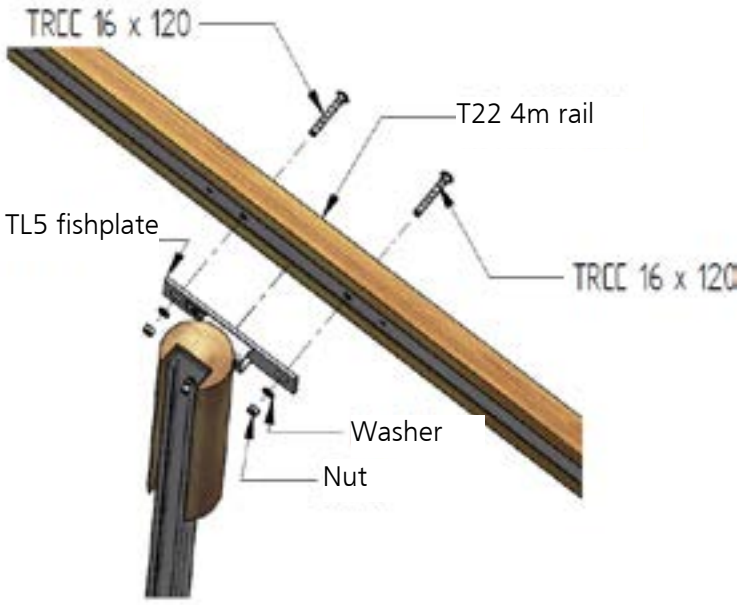

Figure n°4

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STEP 4 - ADJUSTMENT

(Figures n°5 & 6)

After several components installation, it is possible to adjust horizontally the connection between the rails thanks to the TL 62 oblong holes; the height of the rail can be adjusted whilst using the C100 openings.

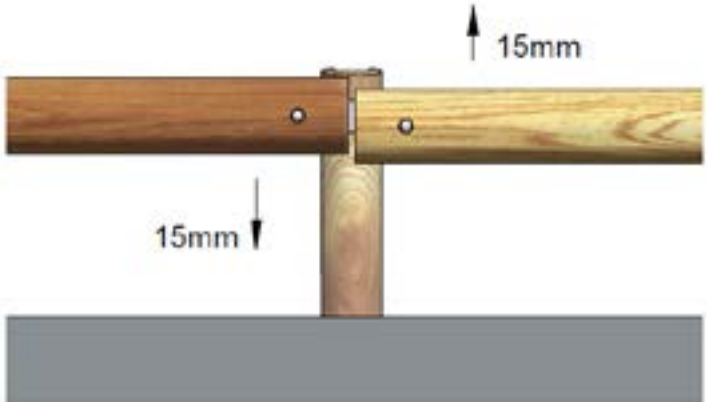

Figure n°5 Adjustment of the rails

Figure n°6 : Guardrail elevation

Tightening torque : when adjustement is made, the whole system could be definitively tightened according to the 140 Nm torque for the beams.

STEP 5 - END TERMINALS TREATMENT

(Figure n°7)

The standard end terminal includes : a 4M T22 rail, a TL41 fishplate, a TL22 fishplate, a TH16-40 bolt with nut.
The terminals can be ramped on a 4m-length with the ends buried into the ground or alternatively, the guardrail can also be terminated at full height onto the back slope.

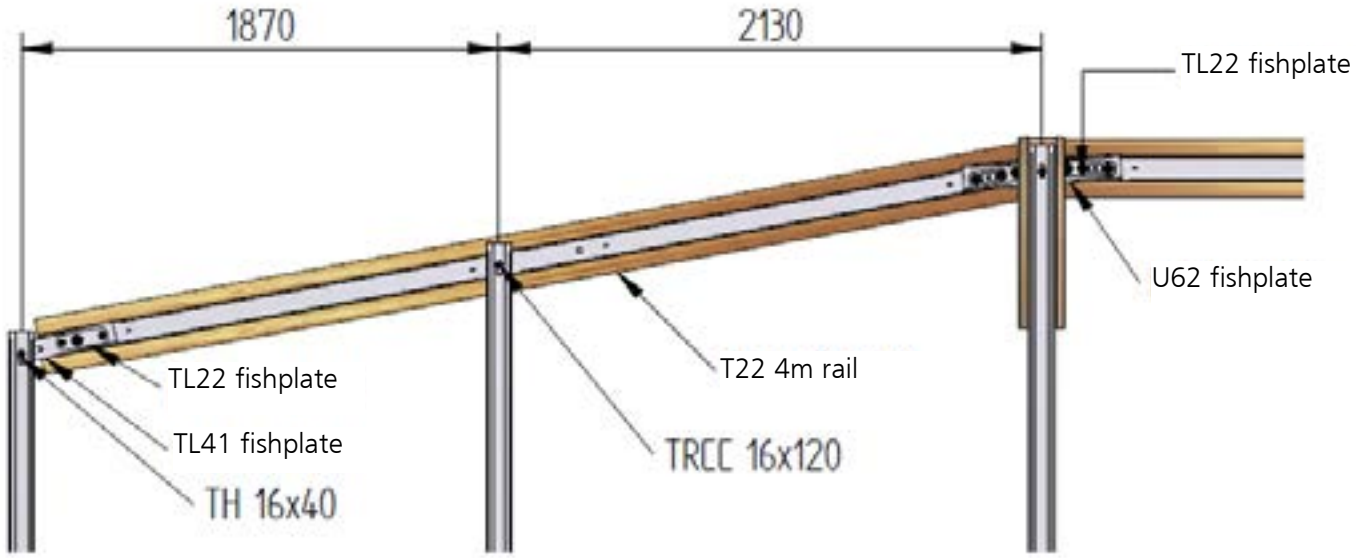

Figure n°7 : Assembly of the end terminal

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9- Motocyclist protection and guardrail accessories

The guardrail could be equipped with steel motocyclist screen to protect motobike drivers.
(Installation manual available with the technical sheet «Motocyclist protection»).
The guardrail could also be equipped with accessories especially designed to improve the safety of all road users : handrail extension, Réflec'bois, connection to wall...

10- Maintenance of the guardrail

Once the guardrail has been installed according to the described above method, there is no specific maintenance requirements.
Even after being pressure-treated, timber remains a living material subject to variations in temperature and humidity. Cracks may appear which is a natural phenomenon not affecting neither the quality nor the durability of the product.

In case of accident, **all damaged parts must be systematically replaced by components supplied by Tertu for guaranting the traceability and the performance of the barrier**. (See section Traceability, components marking)

Furthermore, in case of modification of the guardrail surrounding (adding of permanent obstacles, ditches...), it is recommended to undertake a feasibility study taking into account the performances of the guardrail in order to maintain its proper behaviour.

11- NovaVita

If it is needed to replace one or more aged wooden rails of the system, Tertu is offering the NovaVita solution.
Thank to the smart design of Tertu guardrails, it is easy to change the wood rails without having to dismount the entire system nor weaken the performance of the guardrail.
The rails to be replaced are disconnected from the steel U bars which one remains in place and keeps the site safe during the intervention. New rails are fastened easily on the steel U. This operation could be done either directly on site or at workshop.

12- Environment

▶ Douglas fir, a naturally sustainable specie

For the production of its guardrails, Tertu uses Douglas fir, also called Oregon pine.
This resinous specie is appreciated for its remarkable mechanical properties associated with a high level of natural durability.

In Use Classes 3a and 3b (or 3.1 and 3.2) according to EN 335 standard, Douglas fir is moisture absorption-proof.
The heart of Douglas (heartwood) present in high proportion compared to the sapwood is naturally rot-proof and classified 3.2 without any treatment.

Beyond the technical characteristics, the use of wood makes possible to capture atmospheric carbon dioxide (CO_2) in solid form. Thus, the use of one cubic meter of wood can store one ton of carbon dioxide.

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▶ Autoclave pressure treatment

The wooden beams of the guardrails are pressure treated in autoclave after machining.
The products used for the treatment are **chromium & arsenic free** copper preservatives (WOLMANIT CX10) according to standard **EN-599 and CTBP + certification**. They are not carcinogenic, teratogenic or mutagenic.
Such treated wood materials are recyclable at the end of their life in service.
Thanks to the characteristics of Douglas fir, the autoclave treatment is carried out without a highly energy consuming dry kiln previous operation as required for pine family species.

▶ Recycling valuation

All the components of Tertu steel backed timber guardrails can be integrated into a traditional recycling process.
They do not contain any harmful substances.

13- Certifications

▶ CE

All TERTU steel backed timber guardrails have received a CE Marking Certificate of Conformity according to EN 1317 standard parts 2 and 5. CE marking is based on two essential steps :
1- Initial Type Testing ITT
2- Factory Production Control FPC.

CE certification provides:

- the assurance of a product, tested by a certified crash testing laboratory , complying with the European standard EN 1317
- the guarantee that its components are identical to those used for the Initial Type Testing a control of traceability during production
- the monitoring of the manufacturer by an external Notified Body

▶ ISO 9001

Produits fabriqués dans notre usine certifiée ISO 9001
ISO 9001
BUREAU VERITAS
Certification
FR034574-1

ISO 9001 defines the criteria for a management system. This standard is based on a number of quality management principles, including a customer oriented approach focus, motivation and commitment of the company management as well as continuous improvement.
ISO 9001 helps to ensure that customers get consistent, high-quality products and services with, in return, great business benefits.

Tertu is ISO 9001 certified since 2003

▶ PEFC - Programme for the Endorsement of Forest Certification

Certification System for Sustainable Forest Management

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10-31-2216
Promouvoir la gestion durable de la forêt
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In a general context increasingly sensitive to environmental issues, the certification of sustainable forest management is now an essential prerequisite for the development of the timber market. To make its approach to the consumer a reality, PEFC imposes a chain of supply monitoring at all stages of processing and marketing of products. The PEFC logo guarantees to the consumer buying a wood product that he contributes to the sustainable management of forests.
With PEFC, the wood industry has a competitive argument against other materials. In comparison with other certification systems around the world, PEFC represents the largest certified forest area.
This certification confirms that all the timber supplied to manufacture Tertu mixed wood & steel barriers come from a sustainable French forests management plan.

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