Istituto per le Tecnologie della Costruzione
Consiglio Nazionale delle Ricerche
Via Lombardia 49 - 20098 San Giuliano Milanese – Italy
tel: +39-02-9806.1 – Telefax: +39-02-98280088
e-mail: info@itc.cnr.it

Designated according to Article 29 of Regulation (EU) N° 305/2011.

EOTA Member
www.eota.eu
European Organisation for Technical Assessment
Organisation Européenne pour l'évaluation technique

European Technical Assessment – ETA 13/0868 of 28/06/2019

(English language translation; the original version is in Italian)

GENERAL PART

Trade name of the construction product	**L20 in the versions: L20-1SI-GL; L20-1SZ-GL; L20-1SC-GL; L20-1SI-GM; L20-1SZ-GM; L20-1SC-GM; L20-1SI-GMN; L20-1SZ-GMN; L20-1SC-GMN; L20-2SI-GL; L20-2SZ-GL; L20-2SC-GL; L20-2SI-GM; L20-2SZ-GM; L20-2SC-GM; L20-2SI-GMS; L20-2SZ-GMS; L20-2SC-GMS; L20-2SI-GMN; L20-2SZ-GMN; L20-2SC-GMN; L20-2SI-GMV; L20-2SZ-GMV; L20-2SC-GMV**
Product family to which the construction product belongs	**PAC 34: BUILDING KITS, UNITS, AND PREFABRICATED ELEMENTS. Prefabricated stair kits.**
Manufacturer	**Solidarietà Intrapresa Soc. Coop. Sociale Onlus Via Campo dei Fiori, 3/b – I – 47122 Forlì (FC) – Italy**
Manufacturing plant	**Via Campo dei Fiori, 3/b – I – 47122 Forlì (FC) – Italy**
This European Technical Assessment contains:	**28 pages, including 23 Annexes which form an integral part of this Assessment**
This European Technical Assessment is issued in accordance with Regulation (EU) n° 305/2011, on the basis of	**European Assessment Document (EAD) 340006-00-0506**
This European Technical Assessment is the revision of	**European Technical Assessment 13/0868 issued on 20.06.2018**

The European Technical Assessment is issued by ITC-CNR in Italian language. Translations into other languages shall fully correspond to the original issued document and should be identified as such.
Communication of this European Technical Assessment, including transmission by electronic means, shall be in full (excepted the confidential Annex(es) referred to above). However, partial reproduction can be made with the written consent of ITC-CNR (issuing Technical Assessment Body). In this case partial reproduction has to be designated as such.

SPECIFIC PARTS

1. TECHNICAL DESCRIPTION OF THE PRODUCT

"L20" is a stair kit which realizes a stair system composed by a single or a double mm 8 or mm 10 thick plate structure, located either both on the internal and on the external (next to the wall) side of the stair (double structure "L20-2SI", "L20-2SZ", "L20-2SC") or on the side of the wall only (single structure "L20-1SI", "L20-1SZ", "L20-1SC"). The structure is made of S235JR or S275JR steel or stainless AISI 304 steel and has a shaped profile in three section geometries, type "I" (versions "L20-1SI" and "L20-2SI"), type "Z" (versions "L20-1SZ" and "L20-2SZ") and type "C" (versions "L20-1SC" and "L20-2SC").

With regard to steps, there are five alternatives in the kit which can be combined with the double lateral structure: beech glued laminated timber steps, 40 or 60 mm thick ("GL" codes); pressure bent 3 mm thick metal sheet steps ("GMS" codes); flat sheet 10 mm thick metal steps ("GM" codes); pressure bent 3 mm thick metal sheet steps, tray-shaped ("GMV" codes); flat sheet 3 mm or 5 mm thick metal steps, tread-riser continuous profile ("GMN" codes). As far as the single lateral structure is concerned, there are three alternatives of steps: beech glued laminated timber steps, 40 or 60 mm thick ("GL" codes); flat sheet 10 mm thick metal steps ("GM" codes); flat sheet 3 mm or 5 mm thick metal steps, tread-riser continuous profile ("GMN" codes). Steps may be fastened to the structure either by means of screw bolting or by means of specific bars welded on the structure (see Annexes 11-12).

The structure can be manufactured in one single part (for each flight of steps) or in various parts linked together through dovetail shaped joints. Structures are fixed to the bottom floor at the beginning of the stair and to the top floor at the landing, in addition intermediate supports are provided for, fixed to the wall through plugs, installed every six steps as a maximum (see Annexes 1-2) and anyway where the stair turns on the external side; when the side wall is absent it is possible to make use of supports from the ground, installed every eight steps as a maximum and anyway where the stair turns on the external side, conveniently fixed to the floor through plugs.

External overall dimension of the staircase may vary from mm 500 to mm 1000. Riser height ranges from a minimum of mm 160 up to mm 250, tread width ranges from mm 200 to mm 280 (step mm 260 and mm 340). Staircase may have up to 16 steps, and a maximum height between two floors of mm 4250.

For every layout of the stairs, the riser dimension remains unchanged along the whole flight.

Further complements of the stairs are different typologies of railings (see Annexes 19-20) constituted by either steel vertical posts or steel vertical posts coupled with bands of tubular bars parallel to the handrail and equally distanced from each other along the whole post height. The handrail can be made of solid beechwood or a steel tubular bar positioned at a height of 970 ÷ 1170 mm. For the utilization of the different railing types in each stair system (structure and steps) identified by a specific code, the conditions illustrated in Annexes 3 to 10 (tables) apply.

Geometry, dimensions and construction details are illustrated in Annexes 1 to 21 to this ETA.

2. SPECIFICATION OF THE INTENDED USE IN ACCORDANCE WITH EUROPEAN ASSESSMENT DOCUMENT N° EAD 340006-00-0506

"L20" stairs are intended to be used as indoor stairs in buildings of category "A" according to EN 1990 with air temperature between +5°C and +30°C and relative humidity between 30% and 70%.

The provisions made in this European Technical Assessment are based on an assumed working life of the stairs of at least 50 years, provided that the conditions laid down in clause 2.1 for installation, packaging, transport and storage as well as for appropriate use, maintenance and repair are met. The indications given on the working life cannot be interpreted as a guarantee given by the Manufacturer, but are to be regarded only as a means for choosing the appropriate products in relation to the expected economically reasonable working life of the works.

2.1 Aspects related to the performance of the product

This ETA is issued for stair kit "L20" on the basis of admitted information/data, deposited with ITC-CNR, which identify the kit that was assessed.

The characteristics of the components and of the system not mentioned in this ETA nor in the Annexes shall correspond to the respective values laid down in the Technical Documentation of this ETA, checked by ITC-CNR.

Manufacturing process scheme is deposited with ITC-CNR. Packaging, transport and storage of the components has to be such that they are protected from moisture during transport and storage. The components have to be protected against damage and well identified as part of the kit.

The information about installation and recommendations about installers' qualification and maintenance are provided with the technical documentation from the Manufacturer (Installation Manual), and it is his responsibility to assure that the information about design and installation of the system "L20" is effectively communicated to the concerned people. The information can be given using reproductions of the respective parts of this European Technical Assessment; furthermore, all the data concerning the execution shall be indicated clearly on the packaging and/or on the enclosed instruction sheets using one or several illustrations.

In any case, it is appropriate to comply with national regulations, and particularly concerning fire.

The first maintenance service is carried out after twelve months and consists in evaluating the fastening state of all the connecting screws of the different components. For the maintenance operations of the "L20" stairs the Manufacturer recommends to follow the following instructions. The stairs can be cleaned with a water-moist cloth or, if required, with a non-aggressive detergent. All cleaning tools that may cause wear on the surface of the components of the stair and all products containing abrasive agents and chemical solvents of any kind whatsoever, shall be avoided in any case.

Any localised damage due to accidental actions shall be timely repaired.

3. PERFORMANCES OF THE PRODUCT AND REFERENCE TO THE METHODS USED FOR ITS ASSESSMENT

The calculations and tests for performance assessment of "L20" were carried out in compliance with EAD 340006-00-0506 according to the methods reported herein; performances are valid as long as the components of the kit fully correspond to those described in § 1.

Essential characteristic	Performance
BWR 1: Mechanical resistance and stability	
Load-bearing capacity of the stair	See Annex 22
Load-Displacement behaviour	See Annex 22
Vibration behaviour of the stair	See Annex 22 for "L20-2S" with double structure
Prevention of progressive collapse	Failure of individual components of the stair does not lead to a progressive collapse of the complete stair
Residual load-bearing capacity	Local material failure does not lead to an abrupt total loss of the load-bearing capacity of the steps
Long-term behaviour	Load-bearing capacity is ensured under an appropriate use and maintenance over the indicated working life
Resistance to earthquake	The system with double structure "L20-2S" has been verified (see Annex 23) according to EN 1998-1. Type of soil: "C" Seismic zone: 2 Site factor: S = 1,150 Structural type: frame metal structure with structure factor 1 Ductility class: DCM (medium) Structural factor: one–storey building with one only bay
Durability against physical, chemical, biological agents of the components of the stair	Acceptable for the intended use under appropriate use and maintenance
BWR 2: Safety in case of fire	
Reaction to fire: classification of the components of the kit	

Assessment without the need for testing according to EC Decisions	Class
Steel components according to Decisions 96/603/EC and 2000/605/EC	A1
Glued laminated timber components according to Decision 2005/610/EC	D – s2, d0
Polyamide components	No Performance Assessed

Resistance to fire	No Performance Assessed
BWR 3: Hygiene, health and the environment	
Release of formaldehyde	No Performance Assessed
Release of pentachlorophenol	No Performance Assessed
Radioactive emissions	Not relevant
BWR 4: Safety and accessibility in use	
Geometry	See Annexes 1 to 21
Slipperiness	No Performance Assessed
Safety equipment	No Performance Assessed
Safe breakage	No brittle failure of individual components
Impact resistance	No Performance Assessed

4. ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE (AVCP) SYSTEM APPLIED, WITH REFERENCE TO ITS LEGAL BASE

4.1 System of assessment and verification of constancy of performance

According to the Decision n. 1999/89/EC of the European Commission, the system of assessment and verification of constancy of performance (AVCP) applied to this product (see Annex V to Regulation (EU) 305/2011) is System 2+.
In addition, with regard to reaction to fire, the AVCP system applied according to Decision n. 2001/596/EC is System 4.

4.2 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ITC-CNR.

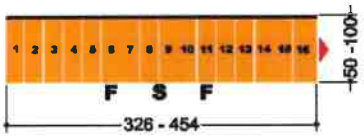
Issued in San Giuliano Milanese, Italy on 28/06/2019
by ITC – CNR

Prof. Antonio Occhiuzzi
Director of ITC-CNR

Annex 1 of European Technical Assessment 13/0868: Flight stair kit "L20"

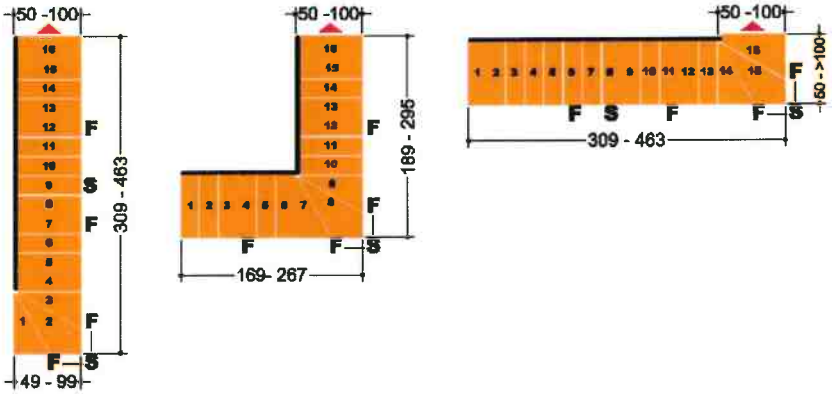
Conformazione rettilinea con larghezza rampa da 50 a 100 Cm.
Pedate da 20 a 28 Cm.

50
↓
100



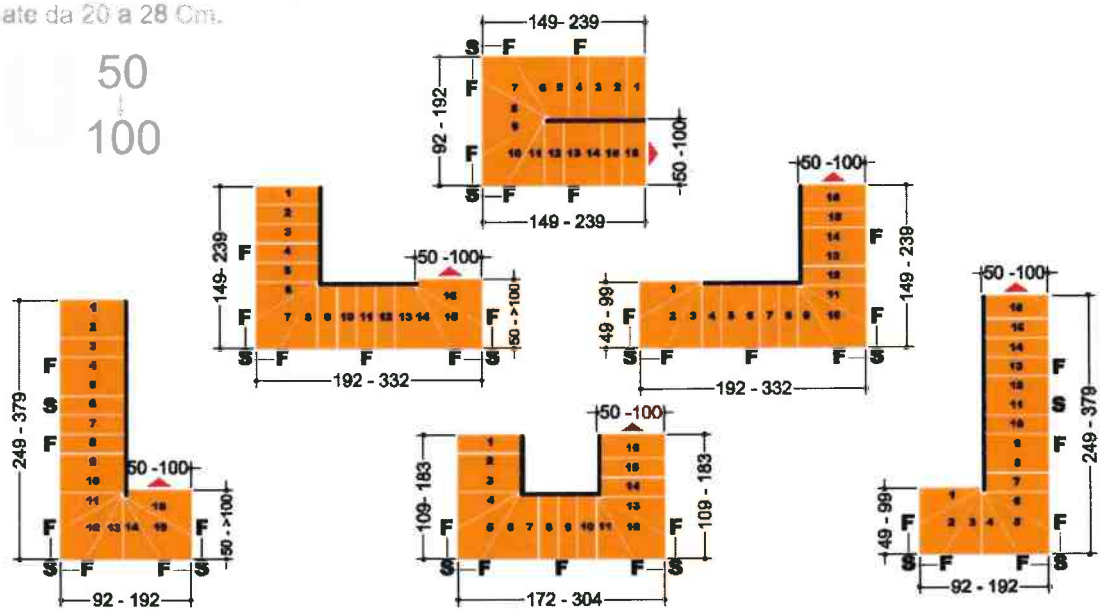
Conformazione ad "L" con larghezze rampe da 50 a 100 Cm.
Pedate da 20 a 28 Cm.

50
↓
100



Conformazione ad "U" con larghezze rampe da 50 a 100 Cm.
Pedate da 20 a 28 Cm.

50
↓
100



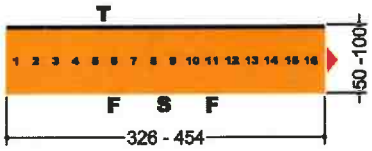
F lateral supports – S supports from the ground (alternatively, if a load-bearing wall is absent)

"L20-2S"	**Annex 1 of European Technical Assessment 13/0868: flight stair kit "L20-2S" with double lateral load-bearing string**
Type and geometries of the stairs	

Annex 2 of European Technical Assessment 13/0868: Flight stair kit "L20"

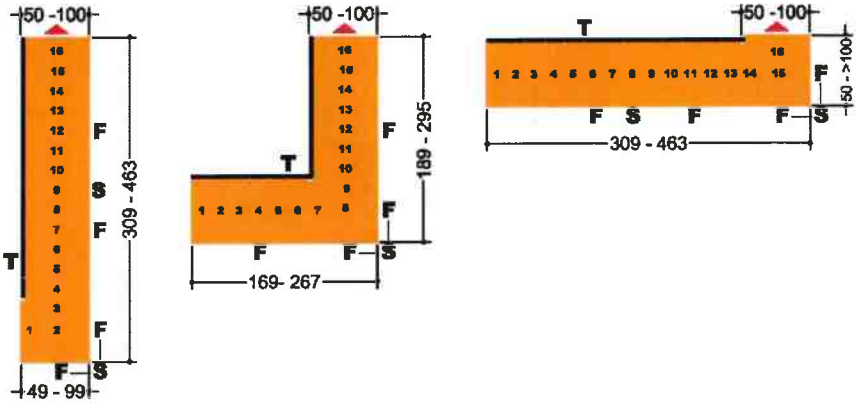
Conformazione rettilinea con larghezza rampa da 50 a 100 Cm.
Pedate da 20 a 28 Cm.

50
↓
100



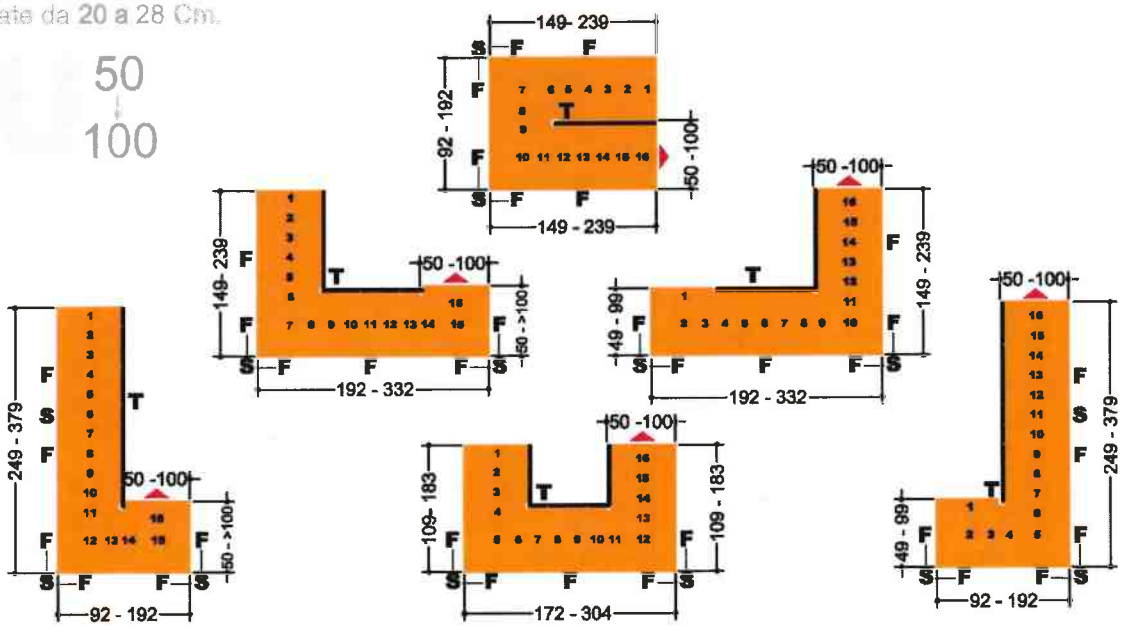
Conformazione ad "L" con larghezze rampe da 50 a 100 Cm.
Pedate da 20 a 28 Cm.

50
↓
100



Conformazione ad "U" con larghezze rampe da 50 a 100 Cm.
Pedate da 20 a 28 Cm.

50
↓
100

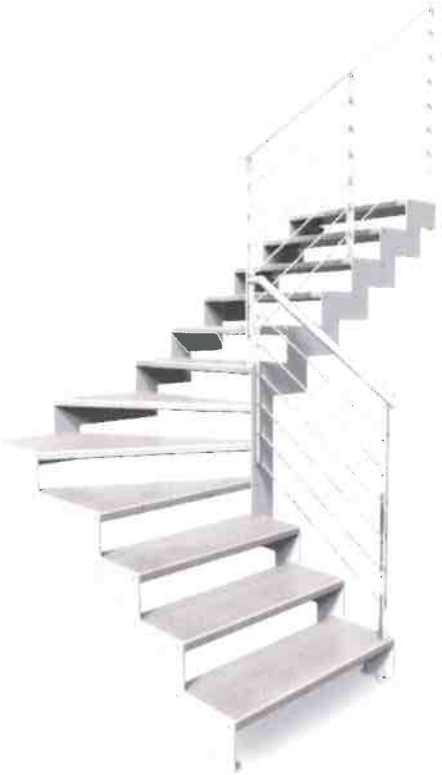


F lateral supports – S supports from the ground (alternatively, if a load-bearing wall is absent) – T supports from the ground in the only configuration with GL steps

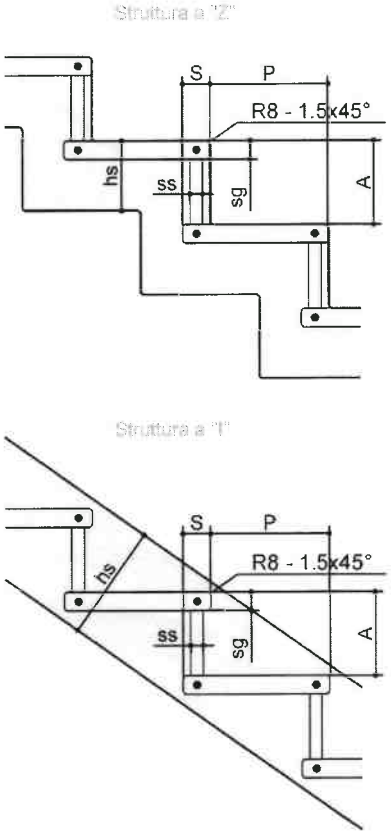
"L20-1S"	**Annex 2 of European Technical Assessment 13/0868: flight stair kit "L20-1S" with single lateral load-bearing string**
Type and geometries of the stairs	

Annex 3 of European Technical Assessment 13/0868: Flight stair kit "L20-2S"

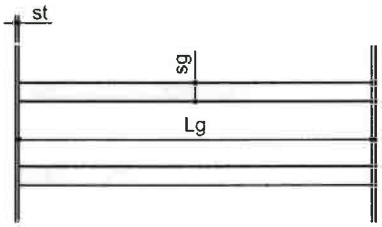
Stair with "Z" structure and L20-2SZ-GL wooden step – an example



Lateral view of the stair with structures: "I" – "Z" – "C"



Front view of the stair with structures: "I" – "Z" – "C"



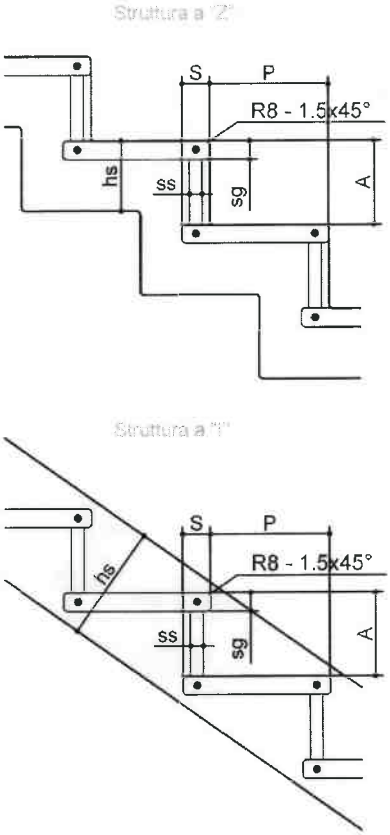
Description	Symbol	Value (mm)
Step width	Lg	500 -1000
Tread	P	200 - 280
Riser	A	160- 250
Step thickness	sg	40 - 60
Overlapping	S	60
Structure height	hs	120-300(1)
Structure thickness	st	8 -10
It is possible to use railing types R1-R2-R4-R5-R6-R7-R8-R10 with GL steps		
(1)For structure height h_s = 120 mm, maximum step width → 800 mm For structure height h_s ≥ 150 mm, maximum step width → 1000 mm		

"L20-2S"	**Annex 3 of European Technical Assessment 13/0868: flight stair kit "L20-2S" with double lateral load-bearing string**
Global view and technical and structural details, with wooden steps (GL)	

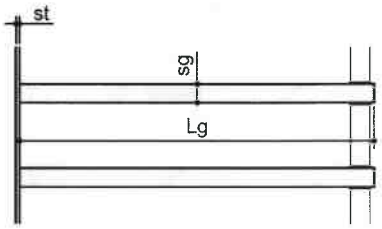
Annex 4 of European Technical Assessment 13/0868: Flight stair kit "L20-1S"

Stair with "Z" structure and L20-1SZ-GL wooden step – an example

Lateral view of the stair with structures: "I" – "Z" – "C"



Front view of the stair with structures: "I" – "Z" – "C"



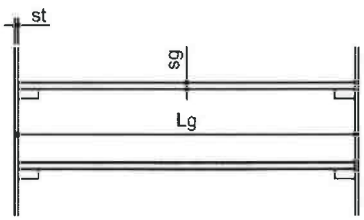
Description	Symbol	Value (mm)
Step width	Lg	500 -1000
Tread	P	200 - 280
Riser	A	160- 250
Step thickness	sg	40 - 60
Overlapping	S	60
Structure height	hs	120-300
Structure thickness	st	8 -10
The use of railing types R1-R2-R4-R7-R8 is only allowed if the GL step is integrated with riser bar; the presence of the riser bar is not necessary with railing types R5-R6-R10		

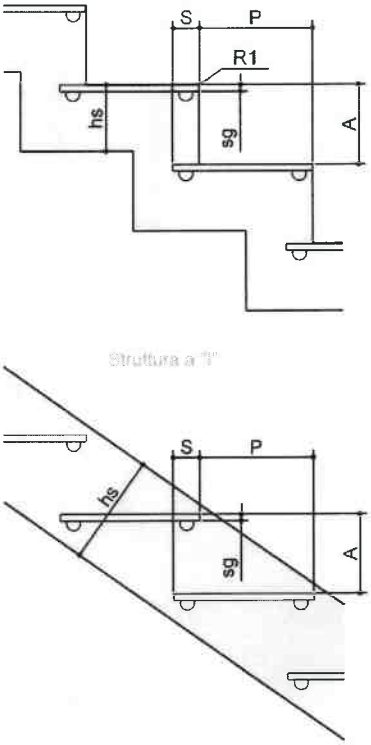
"L20-1S"	**Annex 4 of European Technical Assessment 13/0868: flight stair kit "L20-1S" with single lateral load-bearing string**
Global view and technical and structural details, with wooden steps (GL)	

L20-2SZ-GM

Lateral view of the stair with structures: "I" – "Z" – "C"

Front view of the stair with structures:
"I" – "Z" – "C"

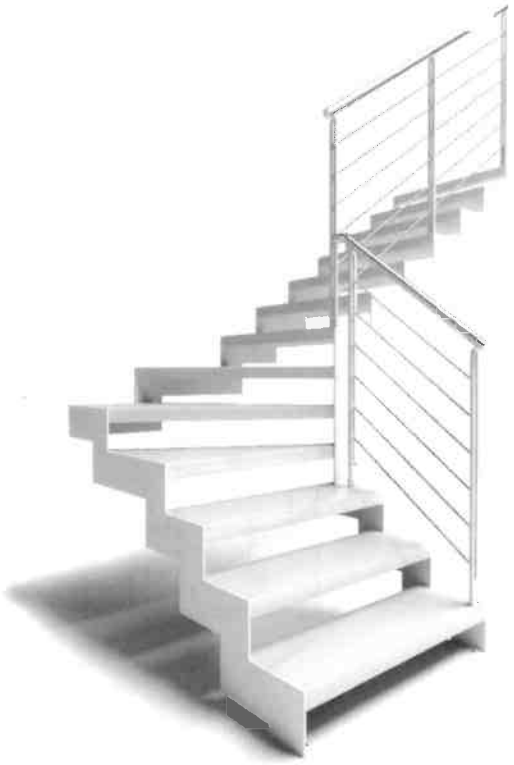




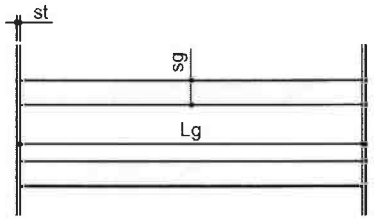
Description	Symbol	Value (mm)
Step width	Lg	500 -1000
Tread	P	200 - 280
Riser	A	160- 250
Step thickness	sg	10
Overlapping	S	60
Structure height	hs	120-300(1)
Structure thickness	st	8 -10
It is possible to use railing types R1-R2-R4-R5-R6-R7-R8-R10 with GM steps		
(1)For structure height h_s = 120 mm → maximum step width = 800 mm For structure height $h_s \geq$ 150 mm → maximum step width = 1000 mm		

"L20-2S"	**Annex 5 of European Technical Assessment 13/0868: flight stair kit "L20-2S" with double lateral load-bearing string**
Global view and technical and structural details, with metal steps (GM)	

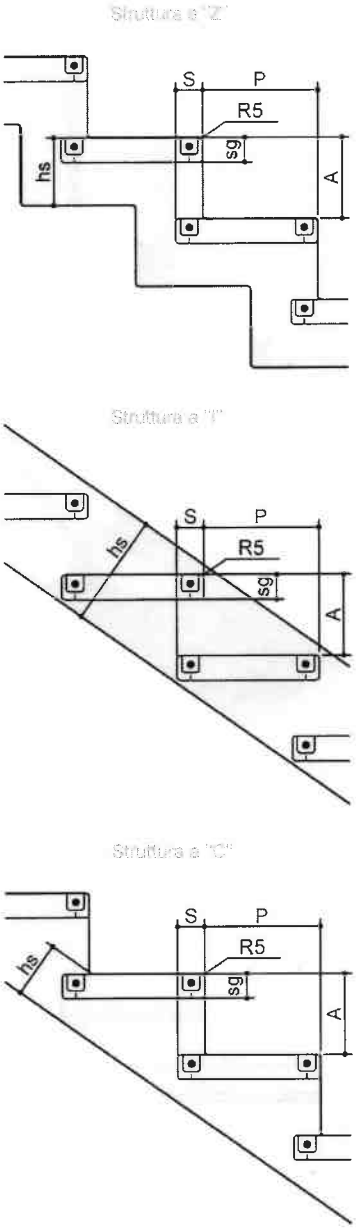
L20-2SZ-GMS



Front view of the stair with structures: "I" – "Z" – "C"



Lateral view of the stair with structures: "I" – "Z" – "C"



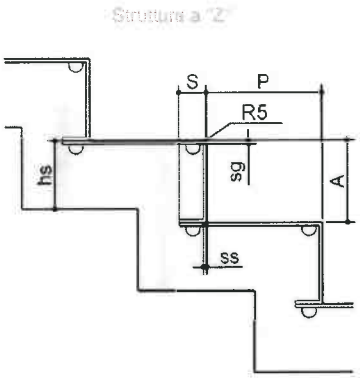
Description	Symbol	Value (mm)
Step width	Lg	500 -1000
Tread	P	200 - 280
Riser	A	160- 250
Step thickness	sg	3 bent to box section 40 and 60
Overlapping	S	60
Structure height	hs	120-300(1)
Structure thickness	st	8 -10
It is possible to use railing types R1-R2-R4-R5-R6-R7-R8-R10 with GMS steps		
(1)For structure height h_s = 120 mm → maximum step width = 800 mm For structure height $h_s \geq$ 150 mm → maximum step width = 1000 mm		

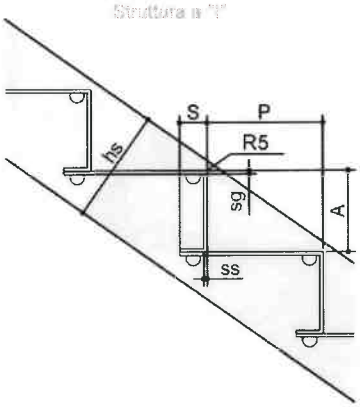
"L20-2S"	**Annex 6 of European Technical Assessment 13/0868: flight stair kit "L20-2S" with double lateral load-bearing string**
Global view and technical and structural details, with metal steps (GMS)	

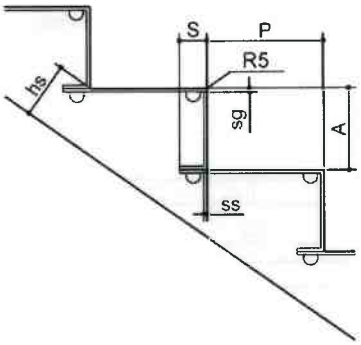
L20-2SZ-GMN

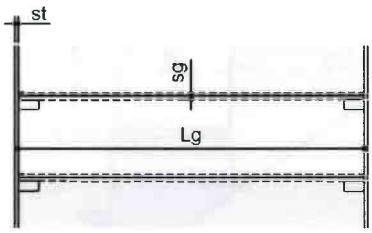
Front view of the stair with structures:
"I" – "Z" – "C"

Lateral view of the stair with structures: "I" – "Z" – "C"







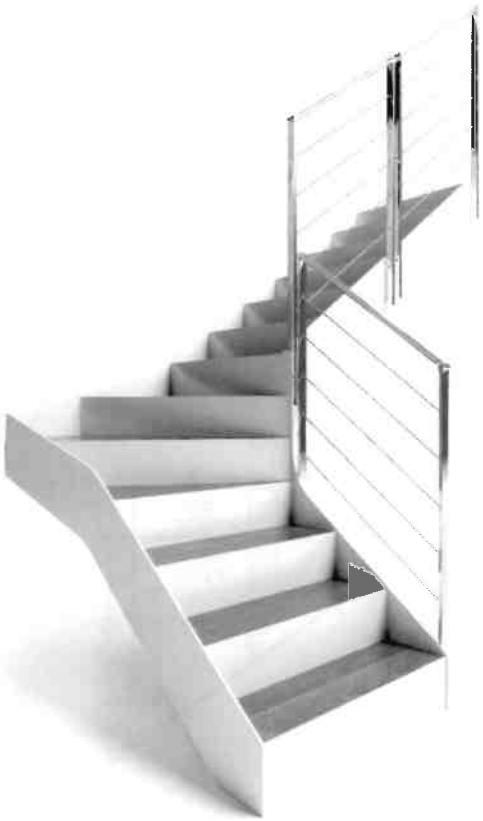


Description	Symbol	Value (mm)
Step width	Lg	500 -1000
Tread	P	200 - 280
Riser	A	160- 250
Step thickness	sg	3 bent
Overlapping	S	60
Structure height	hs	120-300(1)
Structure thickness	st	8 -10
It is possible to use railing types R1-R2-R4-R5-R6-R7-R8-R10 with GMN steps		
(1)For structure height h_s = 120 mm → maximum step width = 800 mm For structure height $h_s \geq$ 150 mm → maximum step width = 1000 mm		

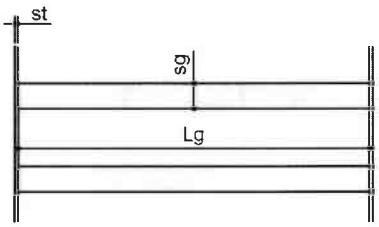
"L20-2S"	**Annex 7 of European Technical Assessment 13/0868: flight stair kit "L20-2S" with double lateral load-bearing string**
Global view and technical and structural details, with metal steps (GMN)	

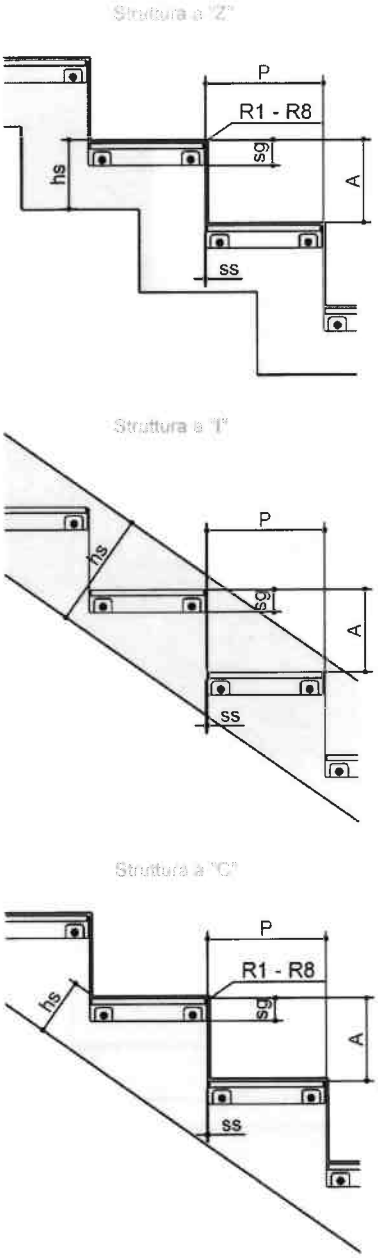
L20-2SZ-GMV

Lateral view of the stair with structures: "I" – "Z" – "C"



Front view of the stair with structures:
"I" – "Z" – "C"



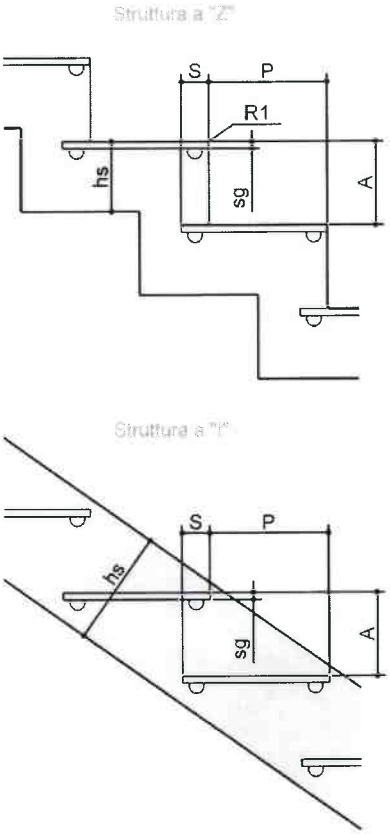


Description	Symbol	Value (mm)
Step width	Lg	500 -1000
Tread	P	200 - 280
Riser	A	160- 250
Step thickness	sg	3 bent to 50
Overlapping	S	0-60
Structure height	hs	120-300(1)
Structure thickness	st	8 -10
It is possible to use railing types R1-R2-R4-R5-R6-R7-R10 with GMV steps		
(1)For structure height h_s = 120 mm → maximum step width = 800 mm For structure height $h_s \geq$ 150 mm → maximum step width = 1000 mm		

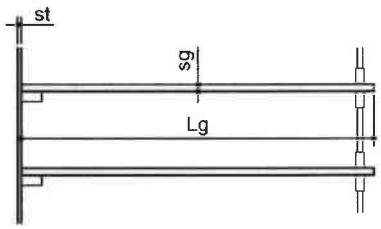
"L20-2S"	**Annex 8 of European Technical Assessment 13/0868: flight stair kit "L20-2S" with double lateral load-bearing string**
Global view and technical and structural details, with metal steps (GMV)	

L20-1SZ-GM

Lateral view of the stair with structures: "I" – "Z" – "C"



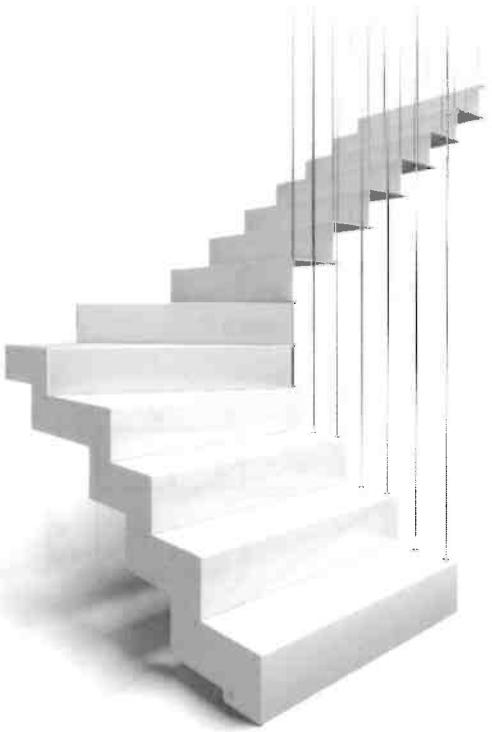
Front view of the stair with structures:
"I" – "Z" – "C"



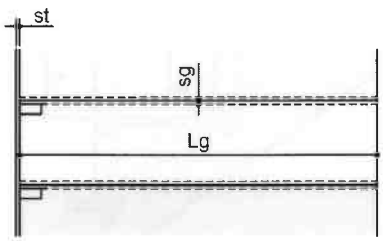
Description	Symbol	Value (mm)
Step width	Lg	500 -1000
Tread	P	200 - 280
Riser	A	160- 250
Step thickness	sg	10
Overlapping	S	60
Structure height	hs	120-300
Structure thickness	st	8 -10
It is only possible to use railing type R10 with GM steps		

"L20-1S"	**Annex 9 of European Technical Assessment 13/0868: flight stair kit "L20-1S" with single lateral load-bearing string**
Global view and technical and structural details, with metal steps (GM)	

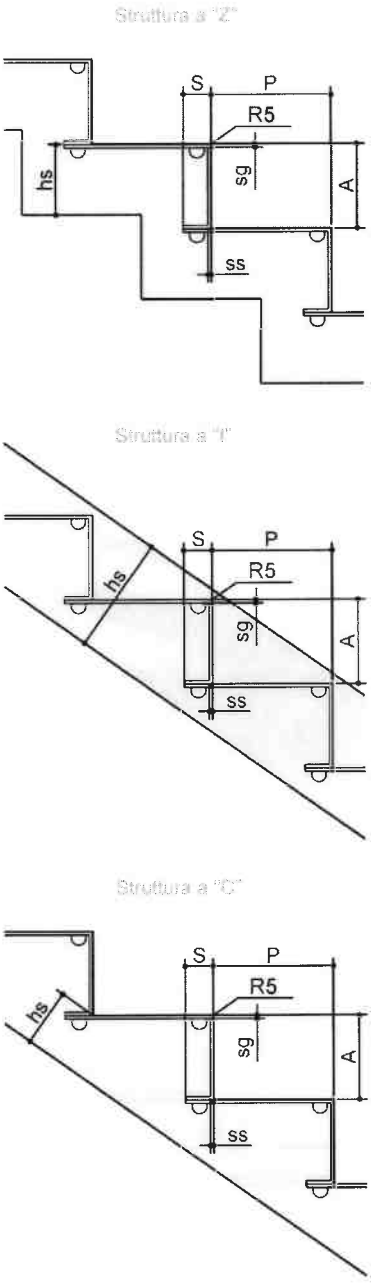
L20-1SZ-GMN



Front view of the stair with structures:
"I" – "Z" – "C"



Lateral view of the stair with structures: "I" – "Z" – "C"

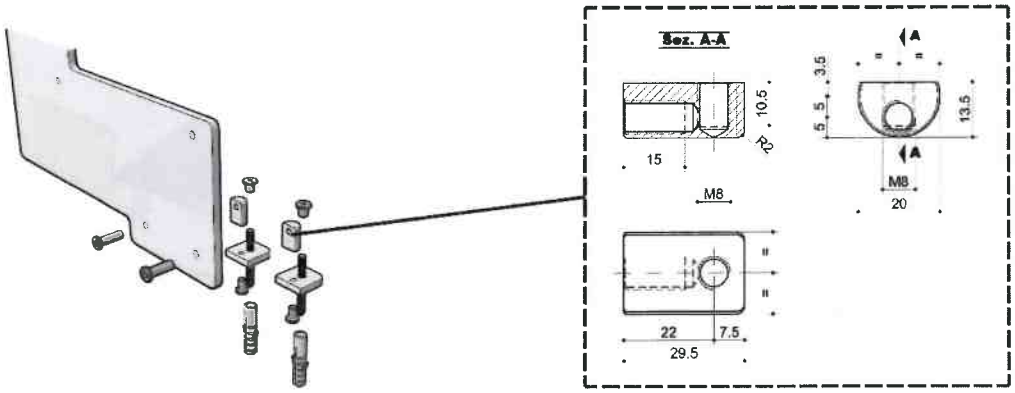


Description	Symbol	Value (mm)
Step width	Lg	500 -1000
Tread	P	200 - 280
Riser	A	160- 250
Step thickness	sg	3 bent
Overlapping	S	60
Structure height	hs	120-300
Structure thickness	st	8 -10
It is only possible to use railing type R10 with GMN steps		

"L20-1S"	**Annex 10 of European Technical Assessment 13/0868: flight stair kit "L20-1S" with single lateral load-bearing string**
Global view and technical and structural details, with metal steps (GMN)	

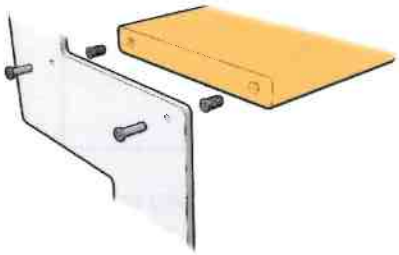
Annex 11 of European Technical Assessment 13/0868: Flight stair kit "L20"

FIXING TO THE BOTTOM FLOOR

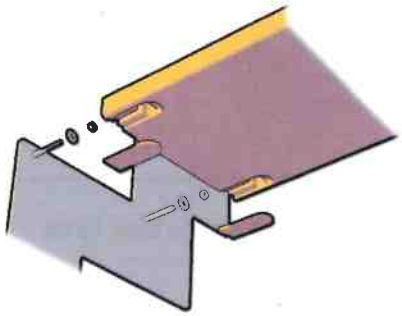


FIXING OF WOODEN STEPS (GL) TO THE STRUCTURE

By screws

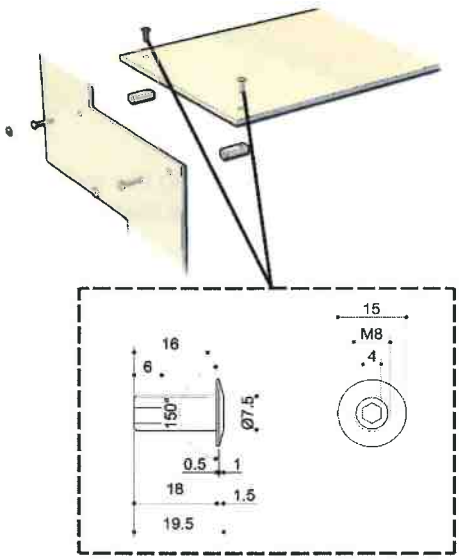


By welded bars

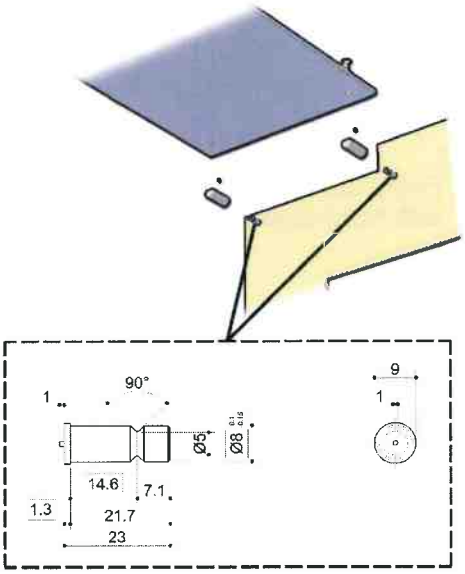


FIXING OF METAL STEPS (GM) TO THE STRUCTURE

By screws



By welded bars

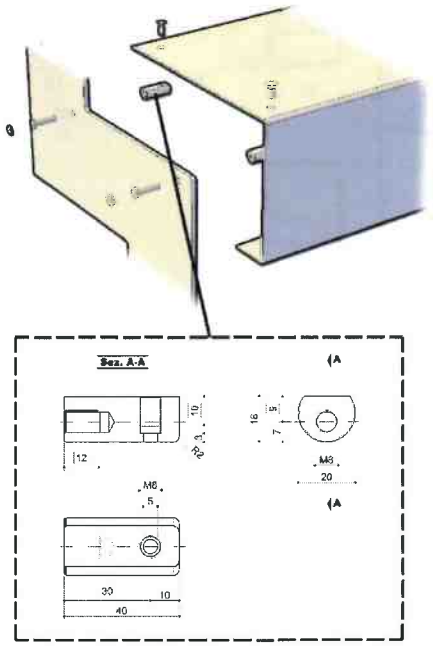


"L20-1S" - "L20-2S"	**Annex 11 of European Technical Assessment 13/0868: flight stair kit "L20" with single/double lateral load-bearing string**
Connection with the floor and structural parts jointing, details	

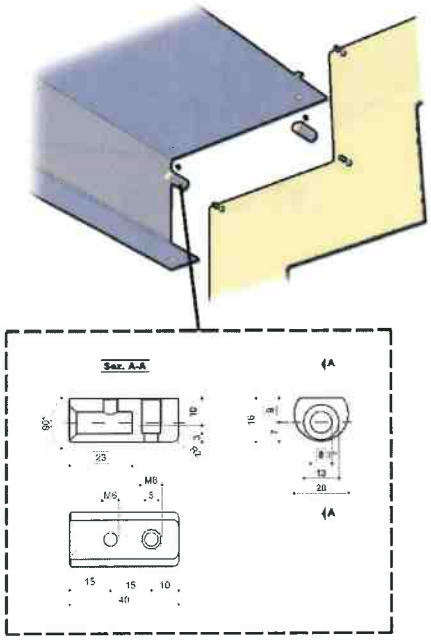
Annex 12 of European Technical Assessment 13/0868: Flight stair kit "L20"

Fixing of tread-riser continuous profile (GMN) steps to the structure

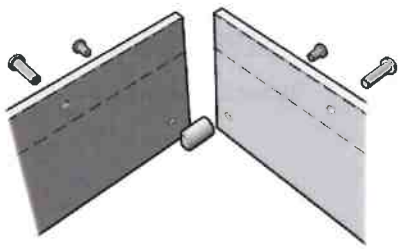
By screws



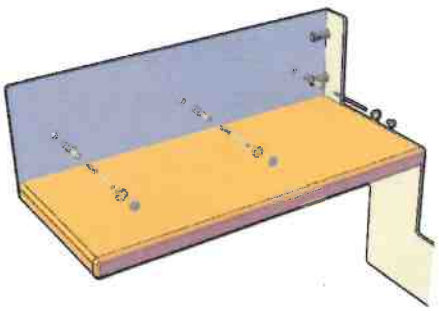
By welded bars



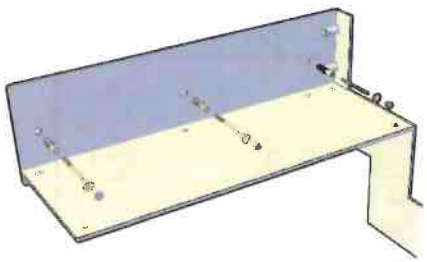
Junction where the stair turns



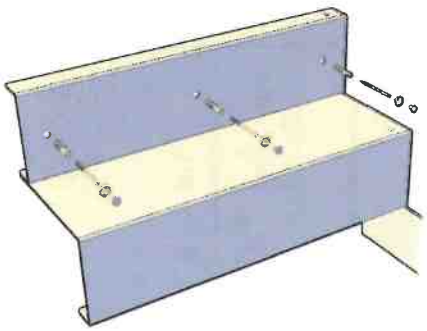
Fixing at the landing to the top floor with wooden step (GL)



Fixing at the landing to the top floor with metal step (GM)



Fixing at the landing to the top floor with tread-riser continuous metal step (GMN)



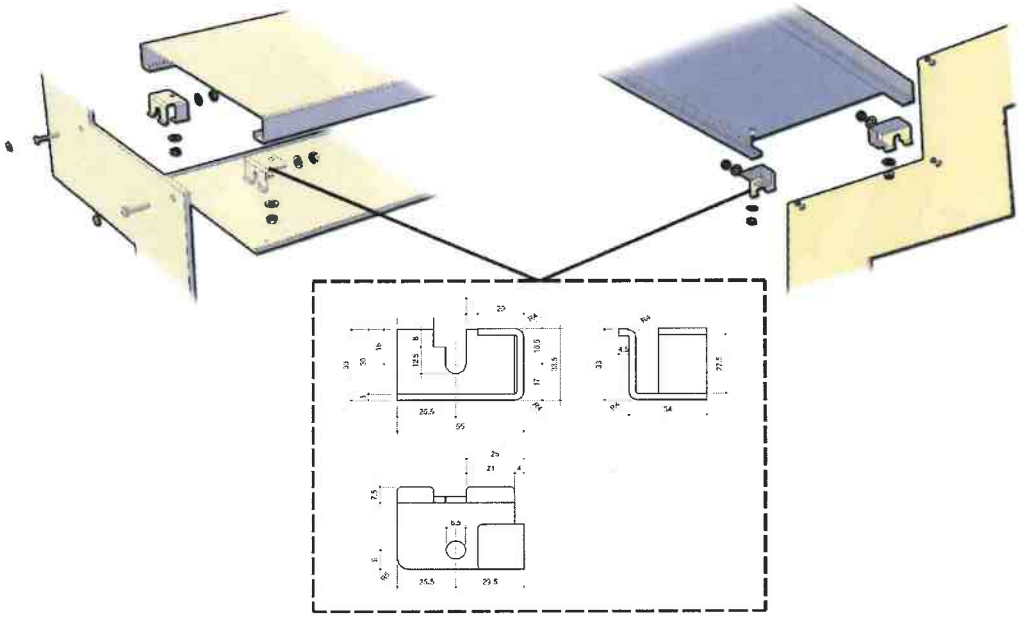
"L20-1S"	**Annex 12 of European Technical Assessment 13/0868: flight stair kit "L20" with single lateral load-bearing string**
Fixing of tread-riser continuous profile (GMN) metal steps to the structure, of the structures at the external turning point and to the top floor of the wooden step (GL), of the metal step (GM) and of the continuous profile metal step (GMN)	

Annex 13 of European Technical Assessment 13/0868: Flight stair kit "L20"

FIXING OF METAL STEPS (GMS) TO THE STRUCTURE

By screws

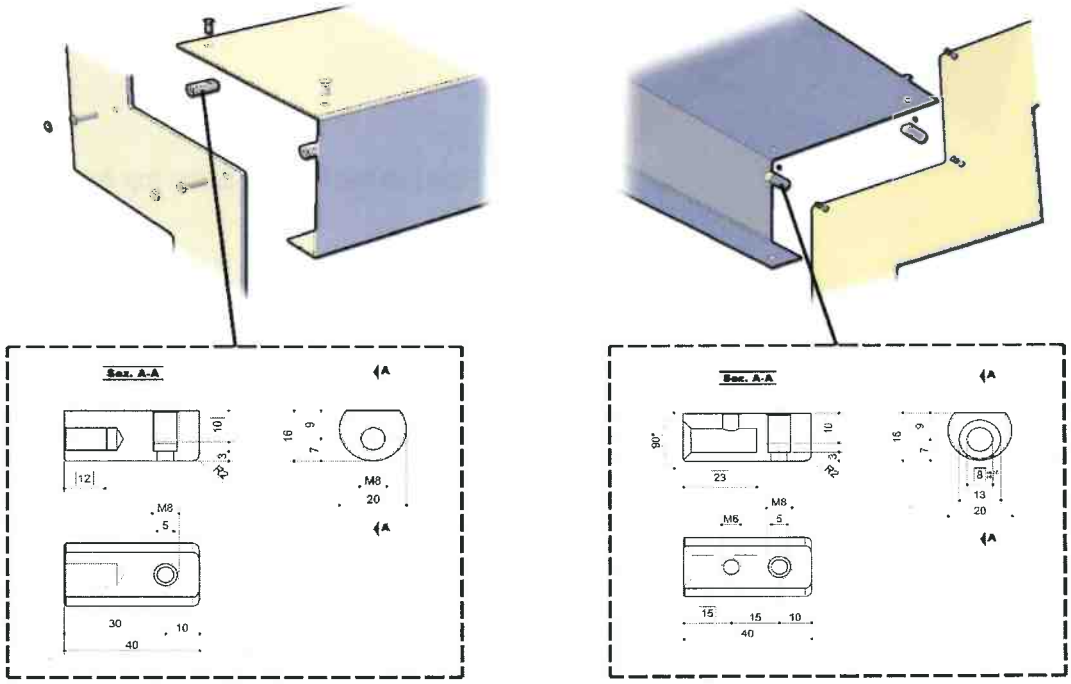
By welded bars



FIXING OF METAL STEPS (GMN) TO THE STRUCTURE

By screws

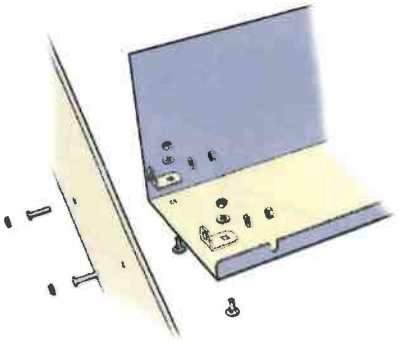
By welded bars



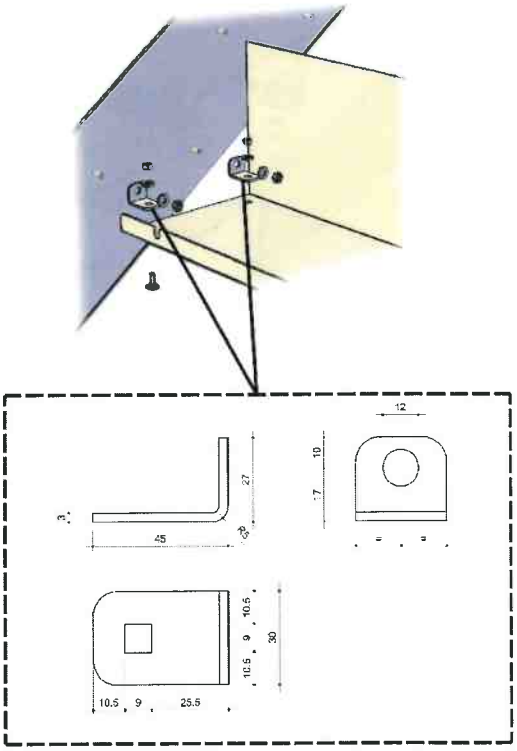
"L20-2S"	**Annex 13 of European Technical Assessment 13/0868: flight stair kit "L20" with double lateral load-bearing string**
Fixing of bent metal steps (GMS) and of continuous profile metal steps (GMN) to the structure	

Fissaggio dei gradini in metallo a vaschetta (GMV) alla struttura

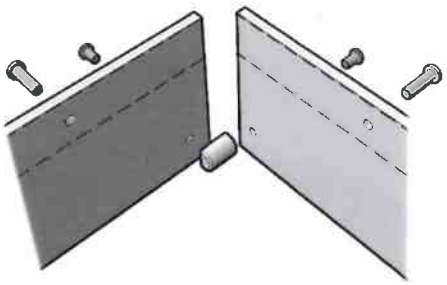
By screws



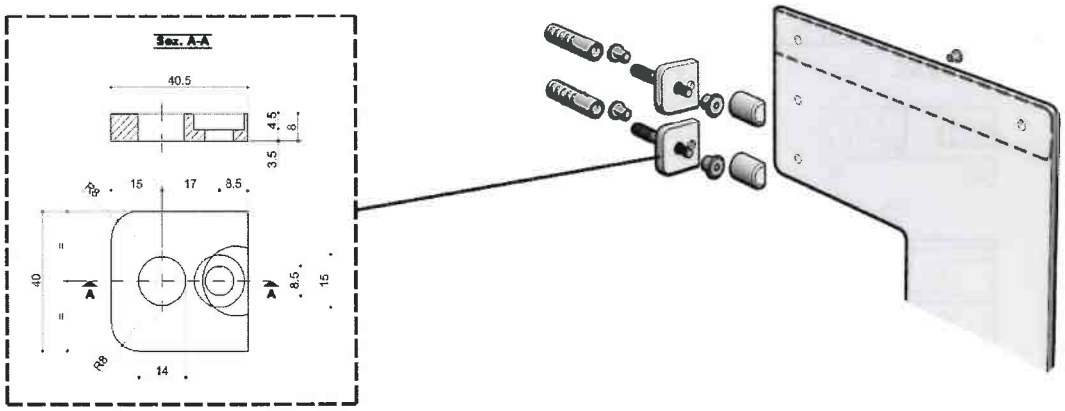
By welded bars



Junction where the stair turns



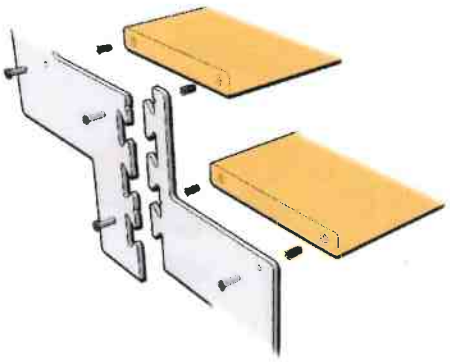
Fixing at the landing to the top floor



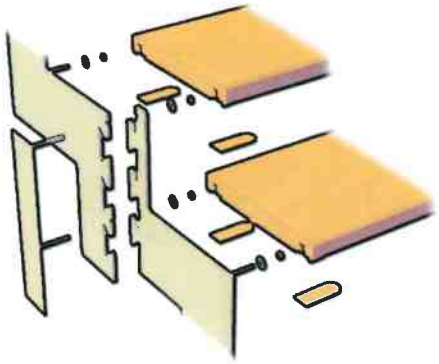
"L20-2S"	**Annex 14 of European Technical Assessment 13/0868: flight stair kit "L20" with double lateral load-bearing string**
Jointing of the metal steps (GMV) to the structure, turning and landing of the staircase, details	

Junction between parts of the structure, with wooden step (GL)

By screws

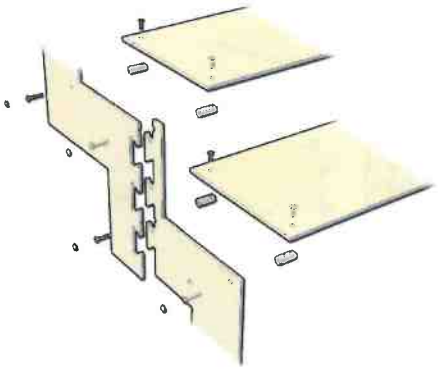


By welded bars

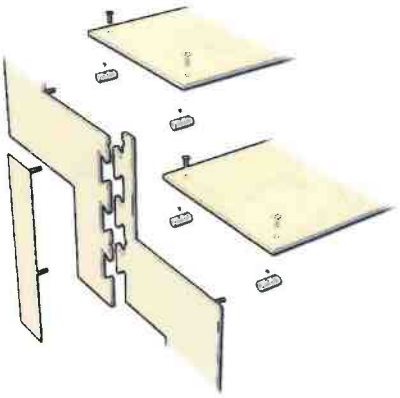


Junction between parts of the structure, with metal step (GM)

By screws

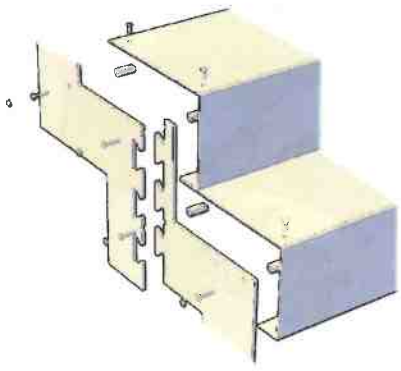


By welded bars

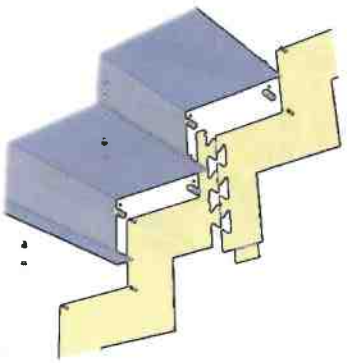


Junction between parts of the structure, with tread-riser continuous metal step (GMN)

By screws



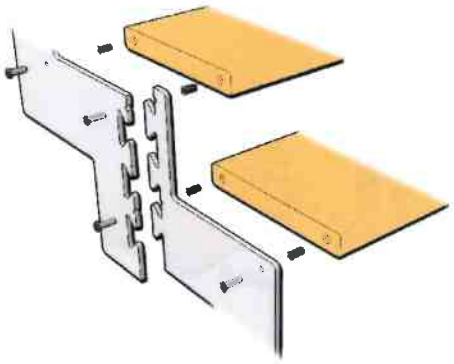
By welded bars



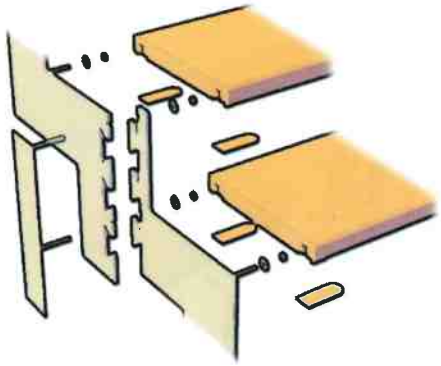
"L20-1S"	**Annex 15 of European Technical Assessment 13/0868: flight stair kit "L20" with single lateral load-bearing string**
Junction between parts of the structure with wooden steps (GL), metal steps (GM) and tread-riser continuous metal steps (GMN)	

Junction between parts of the structure, with wooden step (GL)

By screws

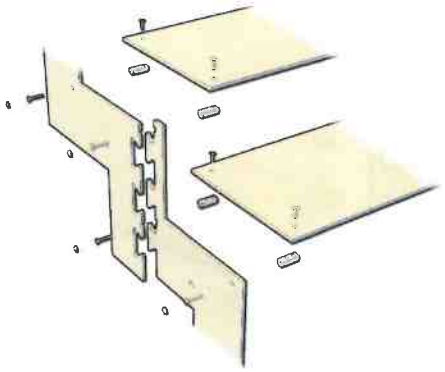


By welded bars

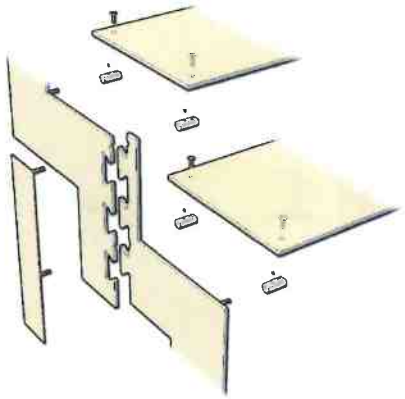


Junction between parts of the structure, with metal step (GM)

By screws

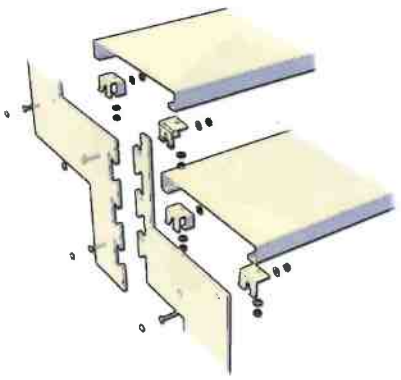


By welded bars

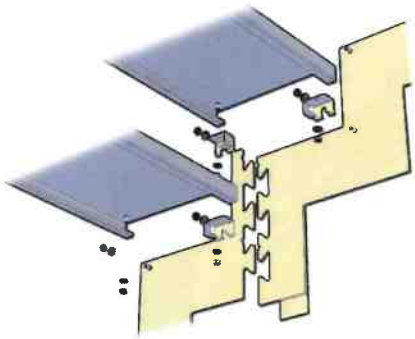


Junction between parts of the structure, with bent metal sheet steps (GMS)

By screws



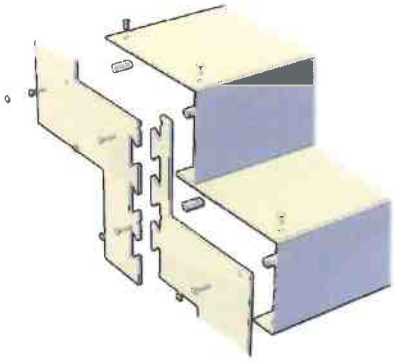
By welded bars



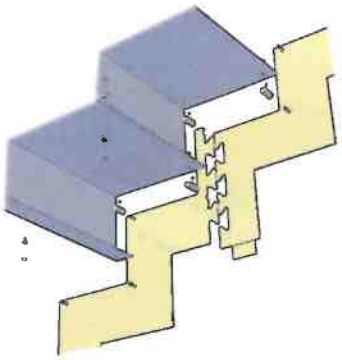
"L20-2S"	**Annex 16 of European Technical Assessment 13/0868: flight stair kit "L20" with double lateral load-bearing string**
Junction between parts of the structure with wooden steps (GL), metal steps (GM) and bent metal steps (GMS)	

Junction between parts of the structure, with tread-riser continuous metal step (GMN)

By screws

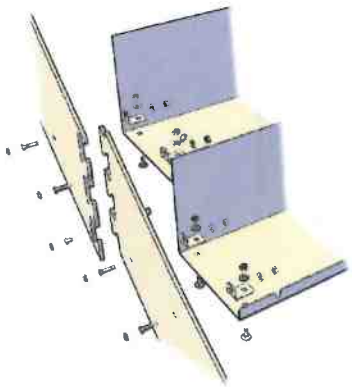


By welded bars

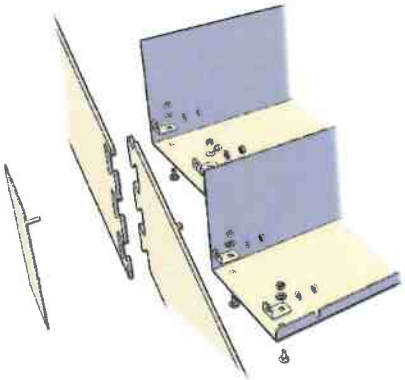


Junction between parts of the structure, with bent metal sheet steps, tray-shaped (GMV)

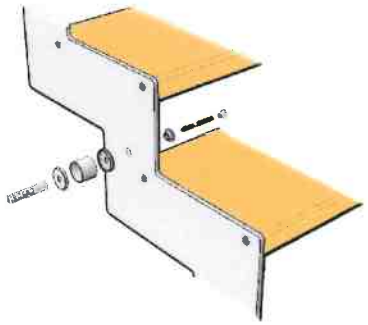
By screws



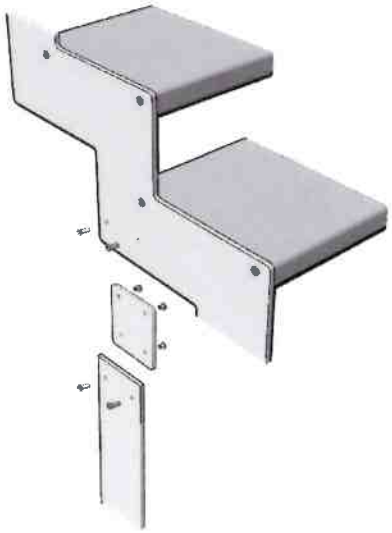
By welded bars



Fixing on side of the staircase

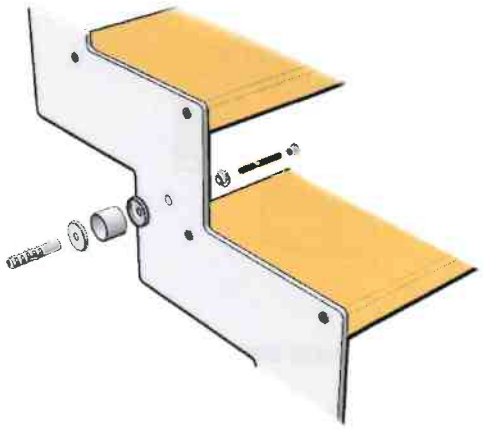


Supports from the ground

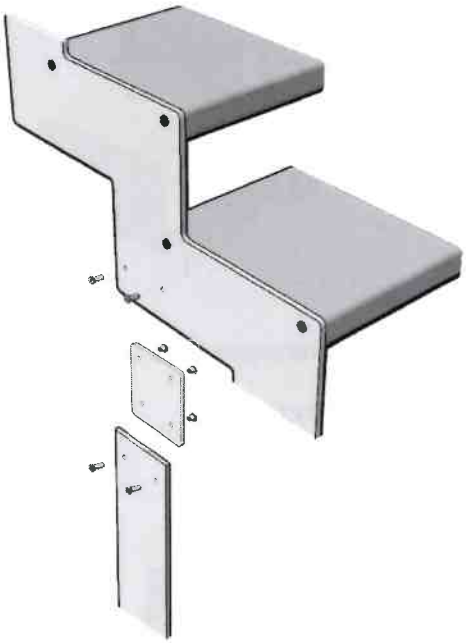


"L20-2S"	**Annex 17 of European Technical Assessment 13/0868: flight stair kit "L20" with double lateral load-bearing string**
Junction between parts of the structure with tread-riser continuous metal steps (GMN), tray-shaped metal steps (GMV). Fixing of the structures on side and to ground with supports from the ground	

Fixing on side of the staircase



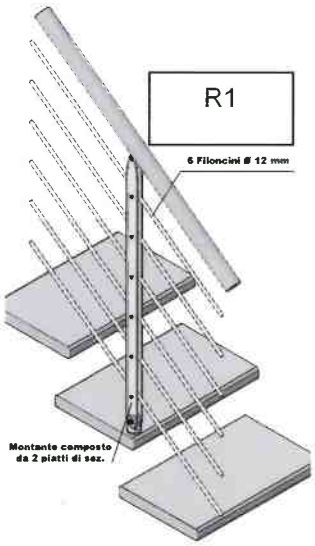
Supports from the ground



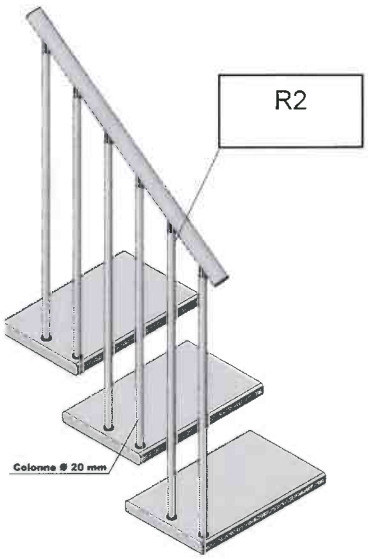
"L20-1S"	**Annex 18 of European Technical Assessment 13/0868: flight stair kit "L20" with single lateral load-bearing string**
Fixing of the structures on side and to ground with supports from the ground	

Annex 19 of European Technical Assessment 13/0868: Flight stair kit "L20"

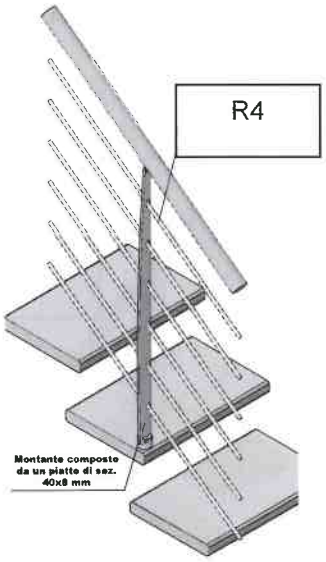
Post with 2 flat bars 40x6 mm and 6 round bars Ø 6/12 mm



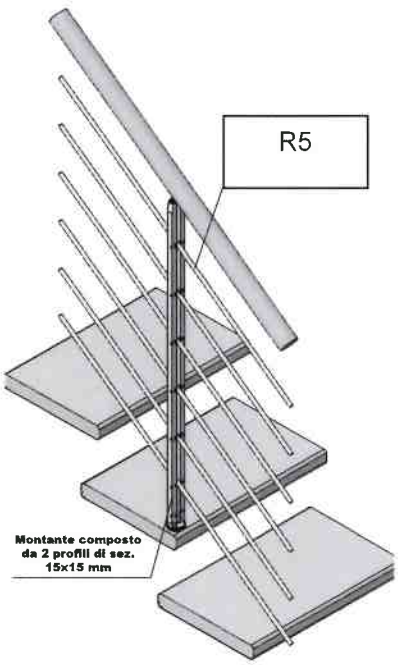
Balusters Ø 20 mm



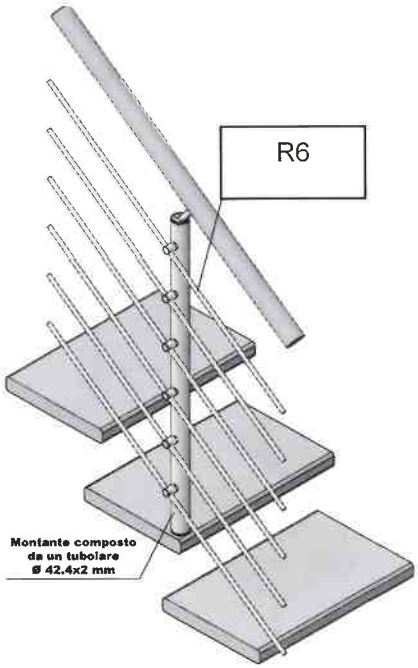
Post with 1 flat bar 40x8 mm and 6 round bars Ø 6/12 mm



Post with 2 profiles 15x15 mm and 6 round bars Ø 6/12 mm



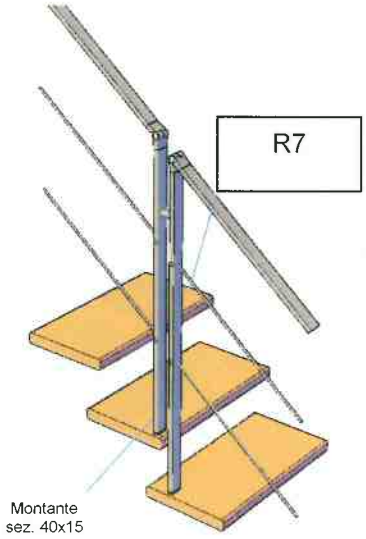
Post with 1 tubular bar Ø 42,4 mm and 6 round bars Ø 6/12 mm



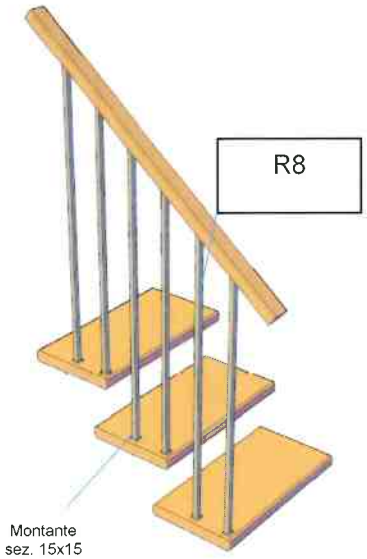
"L20"	**Annex 19 of European Technical Assessment 13/0868: flight stair kit "L20" with single/double lateral load-bearing string**
R1, R2, R4, R5, R6 railings, details	

Annex 20 of European Technical Assessment 13/0868: Flight stair kit "L20"

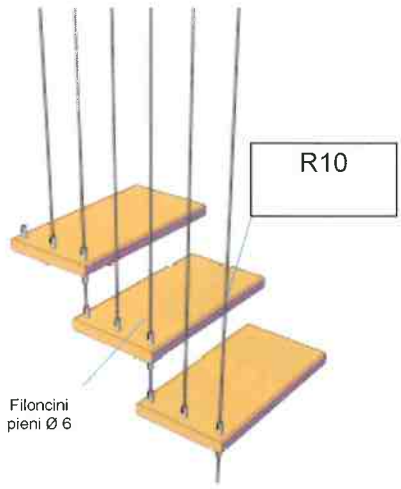
Post with 2 tubular bars 40x15 mm and 2 round bars Ø 6 mm



Square profiles 15x15 mm



Bars with solid section Ø 6 mm from step to ceiling



"L20"	**Annex 20 of European Technical Assessment 13/0868: flight stair kit "L20" with single/double lateral load-bearing string**
R7, R8, R10 railings, details	

Annex 21 of European Technical Assessment 13/0868: Flight stair kit "L20"

Parameter	Value (mm)
Height between floors	From 320 up to 4250
Number of risers	From 2 to 17
Riser	From 160 to 250
Length of the step	260 and 340
Tread width	From 200 to 280
Width of the step	From 500 to 1000
Thickness of the wooden step	40 - 60
Thickness of the metal sheet for steps	3-10 (L20-2S) 5-10 (L20-1S)
Length of the median line of the flight of stairs	5330 (1)
Height of the handrail	From 970 to 1170
Dimensione esterna dei montanti della ringhiera	- (2)
Outer diameter of the handrail	42 - 50
Distance between the railing balusters	From 80 to 900

(1) with 17 average height risers and maximum tread
(2) the post dimension varies depending on the typology of the railing

Components	Materials	Type	Mechanical characteristics
Supporting structures for steps, steps, brackets and posts	Steel	S235 JR EN 10025	f_{tk} = 360 N/mm²
		S275 JR EN 10025	f_{tk} = 430 N/mm²
		Inox AISI 304	f_{tk} = 500 N/mm²
Nuts and bolts	Steel	8.8 class	f_{tk} = 800 N/mm² f_{vk} = 640 N/mm² $f_{d,N}$ = 560 N/mm² $f_{d,V}$ = 396 N/mm²
Steps and handrail	Finger Joint beech	Beech glued laminated timber GL24h EN 14080	f_{mk} = 24 N/mm² f_{vk} = 19.2 N/mm² f_{ck} = 24 N/mm²
Accessories	Polyamide	PAV 6 30% glass fibres	f_{tk} = 66 N/mm² f_{yk} = 38.1 N/mm²

"L20"	Annex 21 of European Technical Assessment 13/0868: flight stair kit "L20" with double lateral load-bearing string
Geometry and materials of the stairs	

Annex 22 of European Technical Assessment 13/0868: Flight stair kit "L20"

Load-bearing capacity of the stair at ultimate limit state - Characteristic values of resistance

Assessment according to the limit state design method as proposed in EN 1990, by testing and calculation

Type of loading	Level kN	Level kN/m²	Level kN/m	γ_M[1]
Vertical variable point load acting on a step in the most unfavourable position Q_{Rk}	3,00			$\gamma_s = 1,05$ $\gamma_w = 1,5$ $\gamma_p = 2,0$ $\gamma_Q = 1,5$
Vertical variable uniformly distributed load q_{Rk}		3,00		
Horizontal variable uniformly distributed load acting on the barrier at the level of the handrail h_{Rk}			NPA	

1) γ_s= partial safety factor of steel
γ_w= partial safety factor of wood
γ_p= partial safety factor of polymers
γ_Q = partial safety factor taking account of the model's uncertainties and dimensional variations (EN 1990:2002/A1:2005/AC)

Load-displacement behaviour at serviceability limit state – Deflections under loading

Assessment by testing and calculation – worst cases considered

		Level
Deflection of the step under service load F_s (point load Q = 2,00 kN) related to the clear width of the stair w_Q	$l \leq 800$ mm	32,5 mm
Deflection of the stair under service load F_s (uniformly distributed load q = 2,00 kN/m²) related to the clear width of the stair w_q	$l \leq 5330$ mm	32,5 mm

Proof of serviceability limit state is only given if the design value of the loads (F_k) does not exceed the values (F_s): $F_k \leq F_s$

Load-bearing capacity – Admissible loads

Minimum values from proof of ultimate limit state and serviceability limit state			
Vertical variable uniformly distributed load	q =	2,00	[kN/m²]
Vertical variable point load	Q =	2,00	[kN]
Horizontal variable uniformly distributed load	h_S =	NPA	

Vibration behaviour of the stair under single point load

Assessment by testing

Deflection and proper oscillation frequency Single point load of F = 1 kN acting on the most unfavourable point		
f_1 = proper oscillation frequency w = deflection of the stair	f_1	w
Type of stair "L20-2S" with double structure	Level Hz	Level mm
Straight R16, 16 steps	5,83	4,02
"L" P3-R13, 16 steps	5,91	1,40
"C" P3-R10-P3, 16 steps	6,99	0,61
"U" P3-P3-R10, 16 steps	11,74	0,65
"L" R6-P3-R7, 16 steps	9,52	1,60
"U" R10-P3-P3, 16 steps	9,05	0,64
"L" R13-P3, 16 steps	5,81	1,30

"L20"	**Annex 22 of European Technical Assessment 13/0868: flight stair kit "L20"**
Load-bearing capacity	

Annex 23 of European Technical Assessment 13/0868: Flight stair kit "L20-2S"

Assessment by calculation

Resistance to earthquake					
SL	Pver	Tr	ag	Fo	T*c
		Years	g		Seconds
SLO	81,0	30,0	0,066	2,400	0,260
SLD	63,0	50,0	0,084	2,390	0,270
SLV	10,0	475,0	0,205	2,430	0,300
SLC	5,0	975,0	0,257	2,480	0,320

ag: maximum horizontal ground acceleration;

Fo: maximum value of spectrum amplification factor during horizontal acceleration;

T*c: starting time of constant speed portion of horizontal acceleration spectrum;

Pver: probability of overcoming;

Tr: return time.

"L20-2S"	**Annex 23 of European Technical Assessment 13/0868: flight stair kit "L20" with double lateral load-bearing string**
Resistance to earthquake	