Instruction manual

Prefabricated frames

MARCEGAGLIA BUILDTECH

ISO 9001

CISQ

Cert. n° 0725/0
Cert. n° 0726/0

IGQ P021
SQ PONTEGGI

SUPPLY	Various modes of supply are available: • sale • sale with buyback agreement • rent • rent with redemption All these modes of supply can be combined with the following services: • assembly • disassembly • service at the building site
MATERIAL	**ZC** hot dip galvanized steel **ZZ** Sendzimir galvanized steel **ZE** electro-galvanized steel **VR** painted steel **TR** tropicalized steel **LG** wood **AL** aluminium
REMARKS	The weight refers to nominal gage values * Production on request

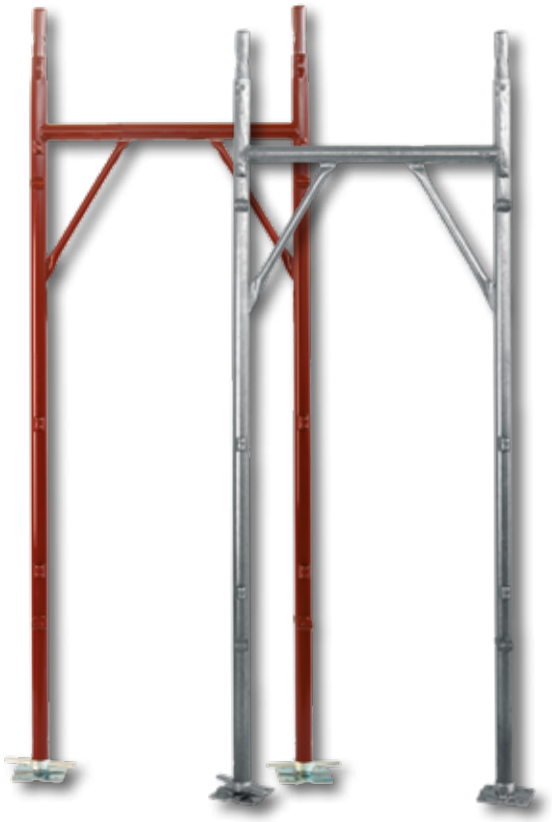
Index

Description
Realpont system

Prefabricated frames: Realpont system 75

System with 75 cm frames with bushings

750 mm deep/wide frame • Painted or hot dipped galvanizing protection Erection of 2500 mm and 3000 mm mixed bay structures • Bushing fittings



SUPPLY

Sales, rent.

UPRIGHTS MATERIAL

- Steel grade S235JR
- Steel tubes: 48.3 mm outside diameter, 2.9 mm S235JRH nominal gage

PROTECTION

- Hot dip galvanized: guaranteed min. coating thickness 55 micron (mean value);
- Painting performed by immersion with resistance tested to ASTM D 2247-87 moist-room test;
- Color: red

CHARACTERISTICS

- Bushing fittings;
- Modular bushing fittings to obtain 1.8 m, 2.5 m and 3,0 m mixed bays;
- Safe erection;
- Licensed for uniform building loads of 300 daN/m2 (cl IV, EN12811)

TUBE CHARACTERISTICS ACCORDING TO EN10219

Outside diameter (mm)	48,30	40,00	38,00	38,00	26,90
Thickness (mm)	2,9	2	4	2,5	2
Section (cm^2)	4,14	2,38	4,27	2,78	1,56
Moment of inertia (cm^4)	10,7	4,32	6,26	4,41	1,22
Section modulus (cm^3)	4,43	2,16	3,29	2,32	0,907
Radius of gyration (cm)	1,61	1,34	1,21	1,25	0,88
Nominal weight (kg/m)	3,27	1,87	3,38	2,18	1,24
Ultimate stress (N/mm^2)	≥ 360	≥ 360	≥ 360	≥ 360	≥ 360
Elongation at rupture (%)	≥ 24	≥ 24	≥ 24	≥ 24	≥ 24

Thickness tolerance: ≤ 5%
Tolerance on the mass ± 5% on parts of at least 10 Ton
Other tolerances: as per ISO 65 recommendations

STANDARD DIMENSIONS

Width	Span	Module
750 mm	1800 mm 2500 mm 3000 mm	2000 mm Fix height

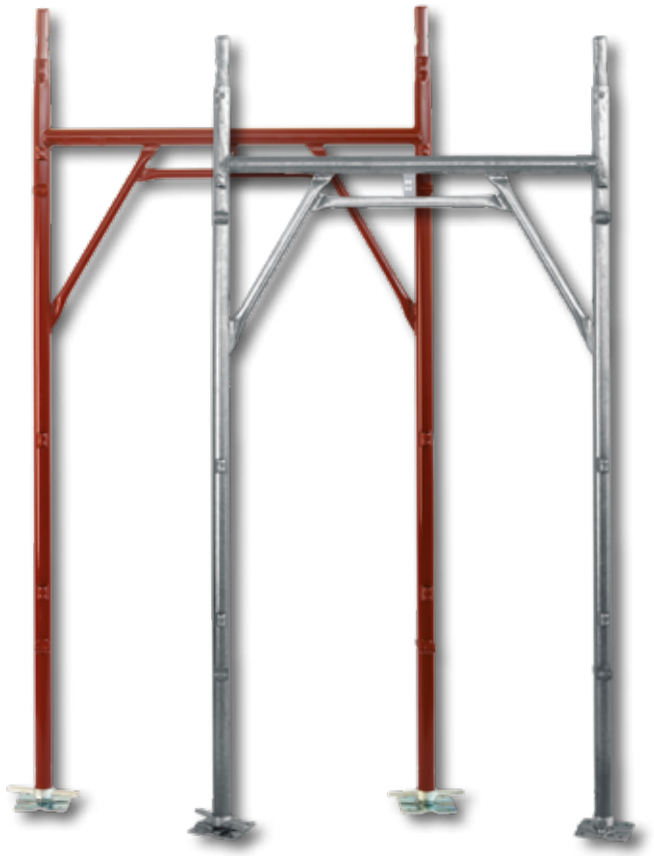
Manufacturing Standards

- Aut. Min. n.15/0009997/14.03.01.03 del 01/06/2005
- Est. 15/VI/3800/14.03.01.02 del 03/08/2006
- Decreto legislativo 9 Aprile 2008 n. 81
- D.M. 02/09/68
- D.M. 23/03/90 n. 115
- Circolari 44/90 e 156 AA.GG./STC.
- Disciplinare UNICMI sul marchio SQ

Prefabricated frames: Realpont system 105

System with 105 cm frames with bushings

Installation of 1050 mm deep working bays • Protection or hot dipped galvanizing protection • Erection of 2500 mm and 3000 mm mixed bay structures • Bushing fittings.



SUPPLY

Sales, rent.

UPRIGHTS MATERIAL

- Steel grade S235JR
- Steel tubes: 48.3 mm outside diameter, 2.9 mm S235JRH nominal gage

PROTECTION

- Hot dip galvanized: guaranteed min. coating thickness 55 micron (mean value);
- Painting performed by immersion with resistance tested to ASTM D 2247-87 moist-room test;
- Color: red

CHARACTERISTICS

- Bushing fittings;
- Modular bushing fittings to obtain 1.8 m, 2.5 m and 3,0 m mixed bays;
- Safe erection;
- Licensed for uniform building loads of 300 daN/m2 (cl IV, EN12811)

TUBE CHARACTERISTICS ACCORDING TO EN10219

Outside diameter (mm)	48,30	40,00	38,00	38,00	26,90
Thickness (mm)	2,9	2	4	2,5	2
Section (cm²)	4,14	2,38	4,27	2,78	1,56
Moment of inertia (cm⁴)	10,7	4,32	6,26	4,41	1,22
Section modulus (cm³)	4,43	2,16	3,29	2,32	0,907
Radius of gyration (cm)	1,61	1,34	1,21	1,25	0,88
Nominal weight (kg/m)	3,27	1,87	3,38	2,18	1,24
Ultimate stress (N/mm²)	≥ 360	≥ 360	≥ 360	≥ 360	≥ 360
Elongation at rupture (%)	≥ 24	≥ 24	≥ 24	≥ 24	≥ 24

Thickness tolerance: ≤ 5%
Tolerance on the mass ± 5% on parts of at least 10 Ton
Other tolerances: as per ISO 65 recommendations

STANDARD DIMENSIONS

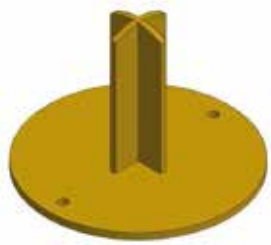
Width	Span	Module
1050 mm	1800 mm 2500 mm 3000 mm	2000 mm Fix height

Manufacturing Standards

- Aut. Min. Realpont 15/0006649/14.03.01.01 del 12/04/2005
- Est. 15/VI/3799/14.03.01.01 del 03/08/2006
- EU 92 15/0009998/14.03.01.03 del 01/06/2005
- Decreto legislativo 9 Aprile 2008 n. 81
- D.M. 02/09/68
- D.M. 23/03/90 n. 115
- Circolari 44/90 e 156 AA.GG./STC.
- Disciplinare UNICMI sul marchio SQ
- n. 15/VI/3974/14.03.01.02 del 3 agosto 2006
- n. 15/VI/7369/14.03.01.02 del 5 maggio 2008

Realpont system - Components

Base plate



mm	material		cod	daN
48	TR	IT/EN	3030100006	0,92

Adjustable base jack

mm	material		cod	daN
355	ZE	IT/EN	3040800902	2,49
700	ZE	IT/EN	3060300141	3,30
1000	ZE	IT/EN	3040501012	4,69

Realpont frame

mm	material		cod	daN
750x2000	VR	IT	3040106100	18,14
750x2000	ZC	IT	3040106101	19,24
750x2000	ZC	EN	3040106071	19,31
1050x2000	VR	IT	3040106000	20,10
1050x2000	VR	EN	3040107000	20,32
1050x2000	ZC	IT	3040106001	21,13
1050x2000	ZC	EN	3040107001	21,13

Realpont half-frame

mm	material		cod	daN
1050x1300	VR	IT	3040105980	15,04
1050x1300	ZC	IT	3040105981	15,08
1050x1300	ZC	EN	3040105991	15,99

Realpont compensation-frame

mm	material		cod	daN
750x1300	VR	IT	3040106130	13,17
750x1300	ZC	IT	3040106131	13,90
750x1300	ZC	EN	3040105961	14,50

Spigot pin

mm	material		cod	daN
100	TR	IT/EN	3040701006	0,12

Guardrail with forged connection devices

mm	material		cod	daN
1800	VR	IT	3040201010	2,76
1800	ZZ	IT/EN	3040201015	2,88
2500	ZZ	IT/EN	3040201175	5,80
3000	ZZ	EN	3040201705	6,69

Horizontal-diagonal brace

mm	material		cod	daN
748x1800	VR	IT	3040206160	2,86
748x1800	ZZ	IT	3040206165	3,33
748x2500	ZZ	IT	3040206175	5,94
748x3000	ZZ	EN	3040201725	6,87
1048x1800	VR	IT/EN	3040206010	3,12
1048x1800	ZZ	IT/EN	3040206015	3,26
1048x2500	ZZ	IT/EN	3040201195	6,23
1048x3000	ZZ	EN	3040201715	7,05

Horizontal-diagonal brace for tapered ends with forged connection devices

mm	material		cod	daN
348x1800	ZZ	IT	3040202065	2,93
348x2500	ZZ	IT	3040201165	5,85
648x1800	ZZ		3040201266	3,03
648x2500	ZZ	IT	3040201155	5,88

Horizontal-diagonal brace for pedestrian walk-thru frame with forged connection device

mm	material		cod	daN
1798x3000	ZZ	EN	3040201745	7,68

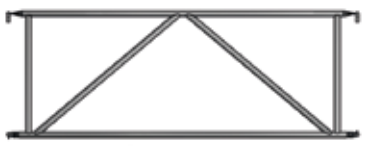
Vertical-diagonal brace

mm	material		cod	daN
1800	VR	IT	3040201000	3,25

Vertical-diagonal brace with forged connection devices

mm	material		cod	daN
1800	ZZ	IT	3040201005	3,40
2500	ZZ	IT	3040201185	6,40
2500	ZZ	EN	3040201195	6,23
3000	ZZ	EN	3040201715	7,05

Double fencing structure



mm	material		cod	daN
1800	VR	IT	3040201900	9,10
1800	ZC	IT	3040201901	10,09
1800	ZC	EN	3040201791	8,85
2500	ZZ	IT	3040201911	15,08
2500	ZC	EN	3040201801	15,42
3000	ZC	EN	3040201851	18,80

Steel definitive guardrail frame

mm	material		cod	daN
750	ZC	EN	3040201691	14,08
1050	ZC	EN	3040201681	15,10
1800	ZC	EN	3040201661	16,98
2500	ZC	EN	3040201671	18,74
3000	ZC	EN	3040201751	21,96

Transom

mm	material		cod	daN
750	VR	IT	3040206180	1,16
750	ZZ	IT	3040206185	1,66
1050	VR	IT	3040206060	1,94
1050	ZZ	IT	3040206065	2,02

Side fencing structure with toeboard

mm	material		cod	daN
750	VR	IT	3040206040	8,25
750	ZC	EN	3040206141	8,67
750	ZC	IT	3040206041	9,37
1050	VR	IT	3040206100	10,75
1050	ZC	EN	3040206131	10,82
1050	ZC	IT	3040206101	11,23

Securdeck scaffold steel plank

mm	material		cod	daN
1800x330x50	ZZ	IT/EN	3070102041	10,80
2500x330x50	ZZ	IT/EN	3070102051	14,38
3000x330x50	ZZ	IT/EN	3070102161	16,75
3000x330x75	ZZ	IT/EN	3070102071	19,90
1800x490x50	ZZ	IT/EN	3070102011	15,16
2500x490x50	ZZ	IT/EN	3070102021	21,30

Steel plank with trapdoor

mm	material	cod	daN
1800x490x50	PZ	3070100011	28,68
1800x490x50	ZZ	3070100031	28,68
2500x490x50	ZZ	3070800031	38,41
1800x660x60	ZZ	3150200191	35,04
2500x660x60	ZZ	3150200201	45,38

Aluminium-plywood plank with frontal opening trapdoor

mm	material	cod	daN
1800x660	AL	3070101149	20,63
2500x660	AL	3070101139	26,35
3000x660	AL	3070101521	31,53

Aluminium-plywood plank with frontal opening trapdoor and ladder

mm	material		cod	daN
2500x660	AL	IT/EN	3070101129	32,38
3000x660	AL	EN	3070101069	38,06

Toeboard

mm	material	cod	daN
1800	ZC	3070200001	5,02
2500	ZC	3070200051	7,35
3000	ZC	3070200071	7,321

Ladder

mm	material	cod	daN
2000	VR	3070300130	6,05
2000	ZC	3070300131	7,35

Compensation frame ladder

mm	material	cod	daN
1330	VR	3070300160	6,05
1330	ZC	3070300161	7,35

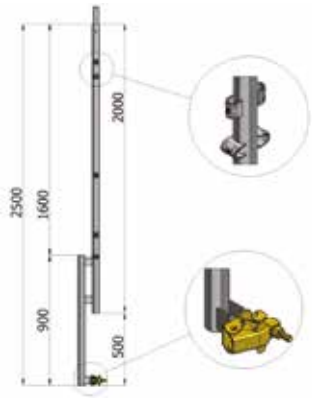
Ladder handrail

mm	material	cod	daN
-	ZC	3070300141	2,78

Simple reinforced terminal

mm	material		cod	daN
-	VR	IT	3040404080	7,15
-	ZC	IT	3040404081	7,84
-	ZC	EN	3040303021	7,84

Top guardrail upright



mm	material		cod	daN
2000	VR	IT	3040404090	11,82
2000	ZC	IT	3040404091	12,36
2000	ZC	EN	3040404111	12,36

Walk-thru frame

mm	material		cod	daN
1796x2516	ZC	IT	3040104081	33,68
1796x2400	ZC	EN	3040104051	34,14

Lower support

mm	material		cod	daN
-	VR	IT	3040101030	18,21
-	ZC	IT	3040101031	19,66

Upper support

mm	material		cod	daN
650x1050	VR	IT	3040106020	25,93
650x1050	ZC	IT	3040106021	27,10

Bracket for Realpont system 75

mm	material		cod	daN
750	ZC	IT	3040306031	6,54
750	VR	IT	3040306030	6,82
750	ZC	EN	3040307501	7,01

Bracket for Realpont system 1050

mm	material		cod	daN
1050	VR	IT	3040306000	8,50
1050	ZC	IT	3040306001	7,98
1050	ZC	EN	3040307201	8,58

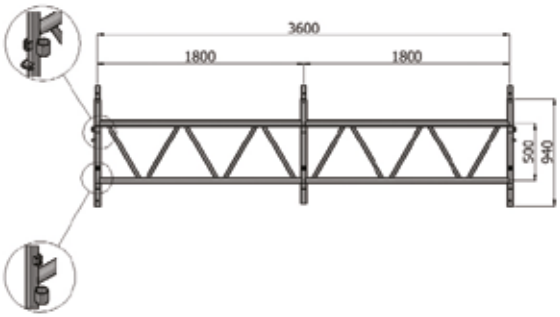
Bracket brace

mm	material		cod	daN
750	ZC	IT/EN	3040306041	8,30
1050	VR	IT/EN	3040305010	8,44
1050	ZC	IT/EN	3040305011	8,73

Street protection fan

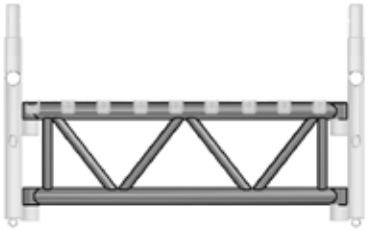
mm	material		cod	daN
-	VR	IT	3040301050	9,19
-	ZC	IT	3040301051	9,65
-	ZC	EN	3040800401	18,60

Bridging ledger



mm	material		cod	daN
3600	VR	IT	3040604020	41,84
3600	ZC	IT/EN	3040604021	43,50
5000	ZC	IT/EN	3040601031	52,82
5400	VR	IT	3040604040	60,66
5400	ZC	IT/EN	3040604041	63,06

Bridging ledger junction



mm	material		cod	daN
748	ZC	EN	3040603021	10,78
748	ZC	IT	3040606011	5,63
1048	VR	IT/EN	3040605010	8,47
1048	ZC	IT	3040605011	8,95

Bracket for loading platform

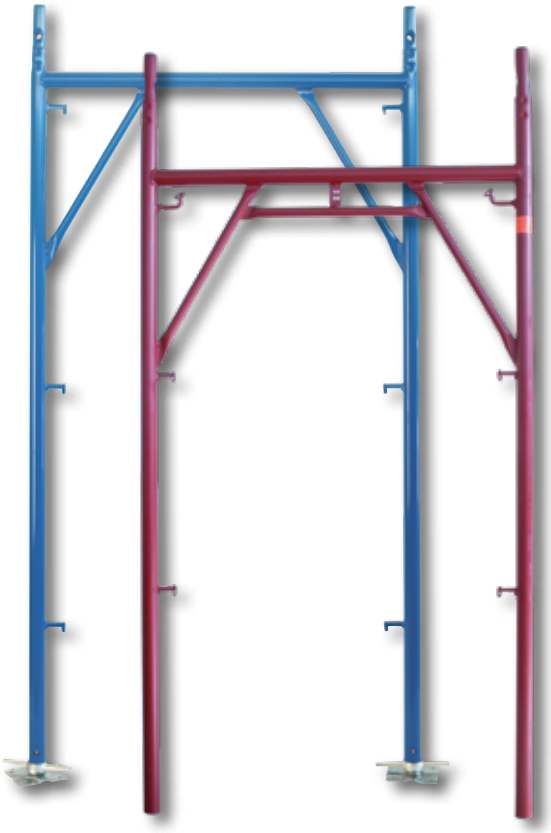
mm	material		cod	daN
1048	VR	IT	3040306900	13,01
1048	ZC	IT/EN	3040306901	13,46

Description
Tel Dal T5/Uniform system

Prefabricated frames: Tel Dal T5/Uniform system

System with 105 cm frames with pawl

1050 mm deep/wide frame • Painted protection by immersion • Erection of 1800 mm mixed bay structures • Pawl fittings



SUPPLY

Sales, rent.

UPRIGHTS MATERIAL

- Steel grade S235JR
- Steel tubes: 48.3 mm outside diameter, 2.9 mm nominal gage

PROTECTION

- Painting performed by immersion with resistance tested to ASTM D 2247-87 moist-room test;
- Color: blue for Tel Dal T5, red for Uniform

CHARACTERISTICS

- Pawl fittings;
- Span: 1,8 m;
- Safe erection;
- Licensed for uniform building loads of 300 daN/m^2 (cl. IV, EN 10811)

TUBE CHARACTERISTICS ACCORDING TO EN10219

Outside diameter (mm)	48,30	40,00	38,00	38,00	26,90
Thickness (mm)	2,9	2	4	2,5	2
Section (cm^2)	4,14	2,38	4,27	2,78	1,56
Moment of inertia (cm^4)	10,7	4,32	6,26	4,41	1,22
Section modulus (cm^3)	4,43	2,16	3,29	2,32	0,907
Radius of gyration (cm)	1,61	1,34	1,21	1,25	0,88
Nominal weight (kg/m)	3,27	1,87	3,38	2,18	1,24
Ultimate stress (N/mm^2)	≥ 360	≥ 360	≥ 360	≥ 360	≥ 360
Elongation at rupture (%)	≥ 24	≥ 24	≥ 24	≥ 24	≥ 24

Thickness tolerance: ≤ 5%
Tolerance on the mass ± 5% on parts of at least 10 Ton
Other tolerances: as per ISO 65 recommendations

DIMENSIONS

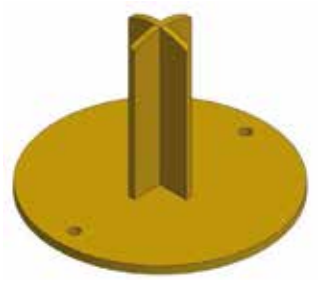
Width	Span	Module
1050 mm	1800 mm	2000 mm Fix height

Manufacturing Standards

- Aut. Min. n.19647/PR-7/B-9 del 10/03/1978
- Aut. Min. n.23455/OM-4 del 04/02/1998
- Decreto legislativo 9 Aprile 2008 n. 81
- D.M. 02/09/68
- D.M. 23/03/90 n. 115
- Circolari 44/90 e 156 AA.GG./STC.

Tel Dal system T5 - Components

Base plate

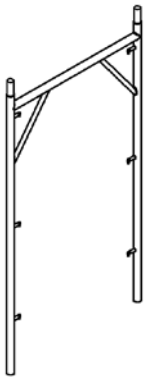


mm	material	cod.	daN
48	TR	3030100006	0,92

Adjustable base jack

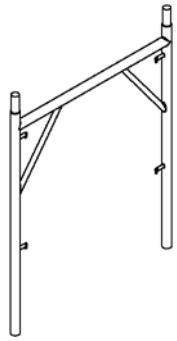
mm	material	cod.	daN
330	ZE	3040501062	2,42
1000	ZE	3040501012	4,69

Frame Tel Dal T5



mm	material	cod.	daN
2000x1050	VR	3040104000	18,83
2000x1050	ZC	3040104001	19,00

Half-frame Tel Dal T5

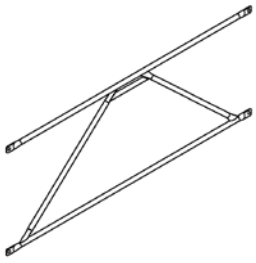


mm	material	cod.	daN
1330x1050	VR	3040104010	14,26
1330x1050	ZC	3040104011	14,30

Spigot pin

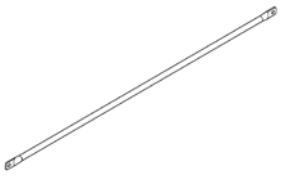
mm	material	cod.	daN
10	TR	3040701006	0,12

Double guardrail P22



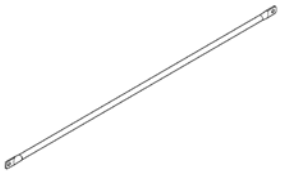
mm	material	cod.	daN
-	VR	3040204030	7,42
-	ZC	3040204031	8,00

Ledger P11



mm	material	cod.	daN
-	VR	3040204020	2,42
-	ZC	3040204021	2,76

Vertical-diagonal brace

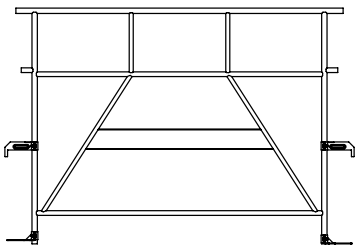


mm	material	cod.	daN
-	VR	3040204000	2,99
-	ZC	3040204001	3,06

Horizontal-diagonal brace

mm	material	cod.	daN
-	VR	3040204050	2,68
-	ZC	3040204051	2,60

Aluminium temporary guardrail frame

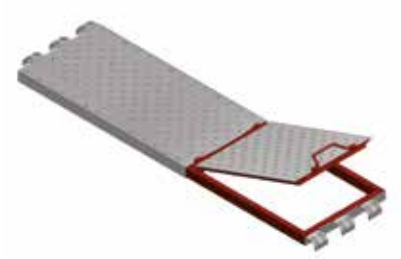


mm	material	cod.	daN
1048	AL	3040201919	12,33
1800	AL	3040201879	12,85

Side fencing structure with toeboard T5

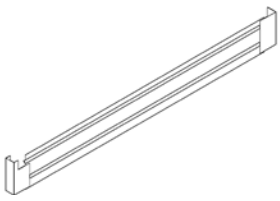
mm	material	cod.	daN
-	VR	3040206120	12,05
-	ZC	3040206121	12,39

Steel plank with trapdoor



mm	material	cod.	daN
1800x500x50	ZZ	3070100011	28,68

Toeboard



mm	material	cod.	daN
1800x500	ZZ	3070100001	18,29

Ladder

mm	material	cod.	daN
2000	VR	3070300130	6,05
2000	ZC	3070300131	7,35

Compensation frame ladder

mm	material	cod.	daN
1330	VR	3070300160	3,96
1330	ZC	3070300161	4,15

Ladder handrail

mm	material	cod.	daN
-	ZC	3070300141	2,78

Top guardrail upright Tel Dal

mm	material	cod.	daN
-	VR	3040404000	7,84
-	ZC	3040404001	7,29

Upright TD4

mm	material	cod.	daN
-	VR	3040404020	7,07
-	ZC	3040404021	7,42

Reinforcement upright RP12

mm	material	cod.	daN
2000	VR	3040406030	8,26
2000	ZC	3040406031	8,58

Walk-thru frame

mm	material	cod.	daN
-	VR	3040104060	32,16
-	ZC	3040104061	33,68

Guardrail ledger for walkthrough passage with forged connection device

mm	material	cod.	daN
-	ZZ	3040204105	4,26

Vertical-diagonal brace for walkthrough passage with forged connection device

mm	material	cod.	daN
-	ZZ	3040204115	5,03

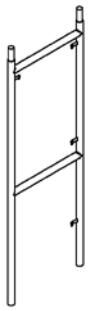
Horizontal-diagonal brace for walkthrough passage with forged connection device

mm	material	cod.	daN
-	ZZ	3040204125	5,84

Horizontal-diagonal brace for walkthrough passage with cold-pressed connection device

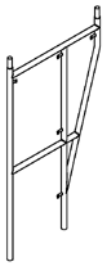
mm	material	cod.	daN
-	VR	3040204120	5,44

Lower support Tel Dal



mm	material	cod.	daN
-	VR	3040104040	17,70
-	ZC	3040104041	18,90

Upper support Tel Dal



mm	material	cod.	daN
-	VR	3040104030	25,32
-	ZC	3040104031	26,25

Inside bracket

mm	material	cod.	daN
330	VR	3040304050	4,29
330	ZC	3040304051	4,43

Bracket for non axial piers

mm	material	cod.	daN
1050	VR	3040304060	7,76
1050	ZC	3040304061	7,98

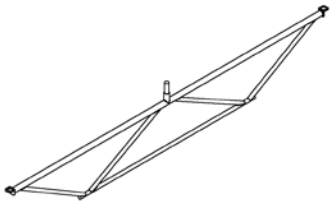
Bracket brace

mm	material	cod.	daN
1050	VR	3040304070	8,63
1050	ZC	3040304071	8,93

Street protection fan

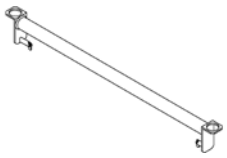
mm	material	cod.	daN
-	VR	3040301050	9,19
-	ZC	3040301051	9,65

Bridging ledger



mm	material	cod.	daN
3600	VR	3040604000	24,39
3600	ZC	3040604001	25,08

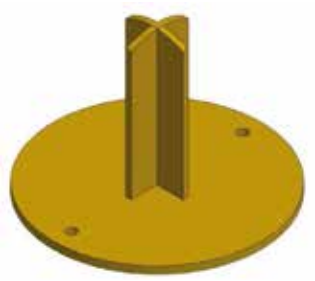
Joists junction



mm	material	cod.	daN
-	VR	3040604010	5,60
-	ZC	3040604011	5,78

Uniform System - Components

Base plate



mm	material	cod.	daN
48	TR	3030100006	0,92

Adjustable base jack

mm	material	cod.	daN
330	ZE	3040501062	2,42
1000	ZE	3040501012	4,69

Frame Uniform

mm	material	cod.	daN
2000x1050	VR	3040102000	19,73

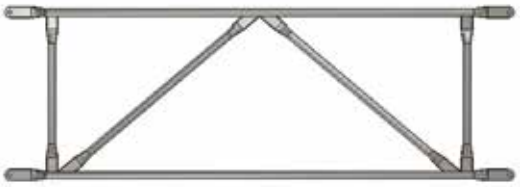
Half-frame Uniform

mm	material	cod.	daN
1330x1050	VR	3040102010	14,79

Spigot pin

mm	material	cod.	daN
10	TR	3040701006	0,12

Side fencing truss Uniform



mm	material	cod.	daN
-	VR	3040402020	8,15

Ledger Uniform

mm	material	cod.	daN
-	VR	3040202010	2,27

Vertical and horizontal-diagonal brace Uniform

mm	material	cod.	daN
-	VR	3040202000	2,68

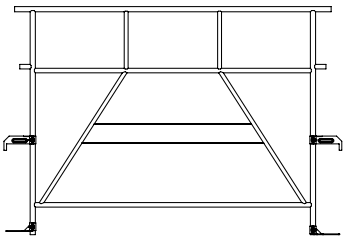
Transom Uniform

mm	material	cod.	daN
-	VR	3040202030	1,82

Side fencing structure with toeboard Uniform

mm	material	cod.	daN
-	VR	3040202040	8,58

Aluminium temporary guardrail frame



mm	material	cod.	daN
1800	AL	3040201919	12,33

Steel plank with trapdoor

mm	material	cod.	daN
1800x490x50	ZZ	3070100011	28,68

Toeboard

mm	material	cod.	daN
1800x200	ZZ	3070200001	5,02

Ladder

mm	material	cod.	daN
2000	VR	3070300130	6,05
2000	ZC	3070300131	7,35

Compensation frame ladder

mm	material	cod.	daN
1330	VR	3070300160	3,96
1330	ZC	3070300161	4,15

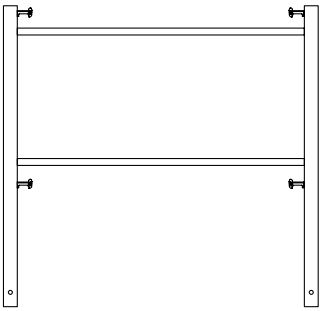
Ladder handrail

mm	material	cod.	daN
2000	ZC	3070300141	2,78

Top guardrail upright Uniform

mm	material	cod IT	daN IT
-	VR	3040402000	7,15

Top end double element Uniform



mm	material	cod.	daN
-	VR	3040402010	9,00

Lower support Uniform

mm	material	cod.	daN
-	VR	3040102030	17,10

Upper support Uniform

mm	material	cod.	daN
-	VR	3040102020	24,95

Bracket for non axial piers Realpont/Uniform

mm	material	cod.	daN
1050	VR	3040306000	8,50
1050	ZC	3040306001	8,82

Bridging ledger

mm	material	cod.	daN
3600	VR	3040604000	24,39
3600	ZC	3040604001	25,08
5400	VR	3040601020	50,70
5400	ZC	3040601021	52,32

Bracket brace

mm	material	cod.	daN
1050	VR	3040306010	8,44
1050	ZC	3040306011	8,73

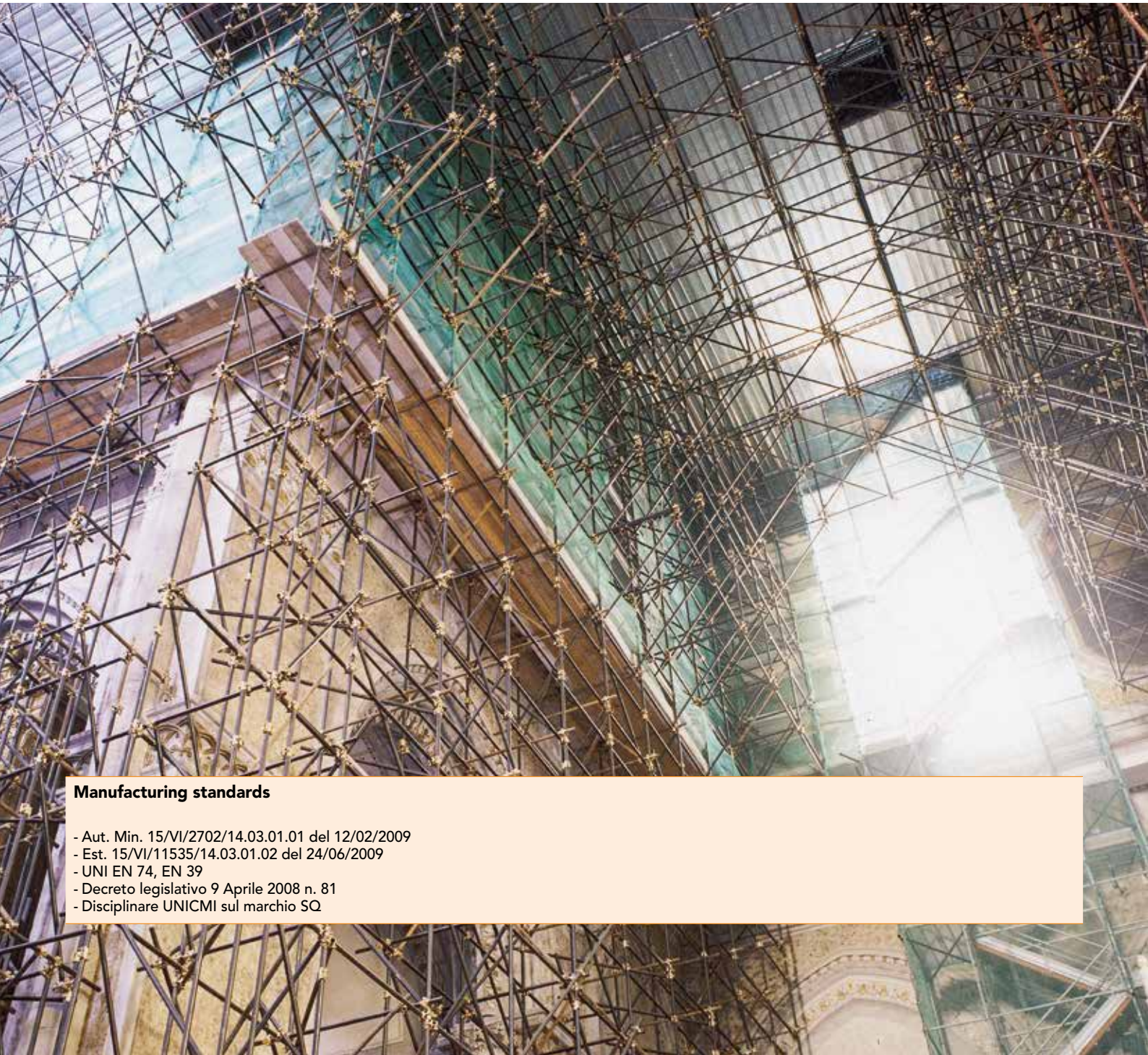
Bridging ledger junction

mm	material	cod.	daN
1050	VR	3040605010	8,47
1050	ZC	3040605011	8,95

Street protection fan

mm	material	cod.	daN
-	VR	3040301050	9,19
-	ZC	3040301051	9,65

Description
Tube-coupler system

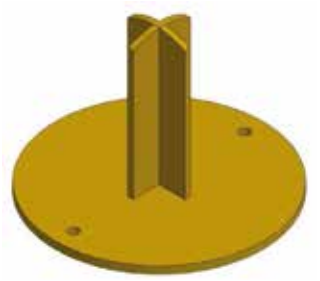


Manufacturing standards

- Aut. Min. 15/VI/2702/14.03.01.01 del 12/02/2009
- Est. 15/VI/11535/14.03.01.02 del 24/06/2009
- UNI EN 74, EN 39
- Decreto legislativo 9 Aprile 2008 n. 81
- Disciplinare UNICMI sul marchio SQ

Tube-coupler system - Components

Base plate



mm	material	cod.	daN
48	TR	3030100006	0,92

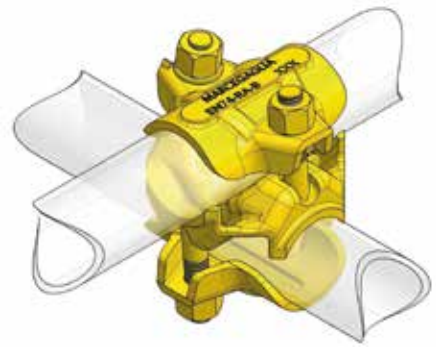
Adjustable base jack

mm	material	cod.	daN
355	ZE	3040800902	2,49
1000	ZE	3040501012	4,69

2-bolts right angle coupler

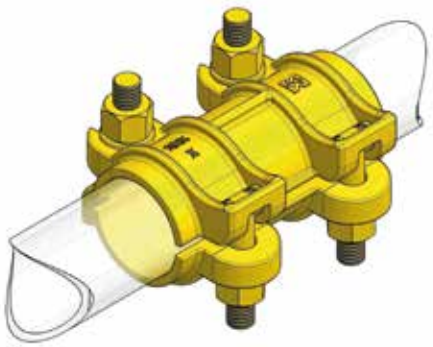
mm	material	cod.	daN
-	TR	3020600006	0,88

4-bolts right angle coupler



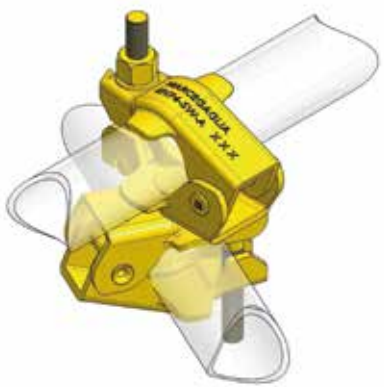
mm	material	cod.	daN
-	TR	3020300006	1,42
-	TR	3020300032	1,35

Simple 4-bolts coupler



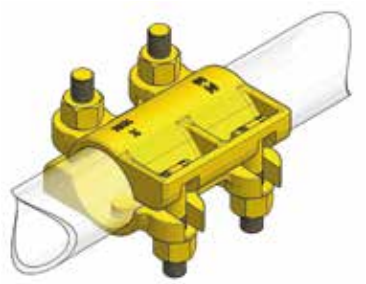
mm	material	cod.	daN
-	TR	3020200006	1,93

Swivel coupler



mm	material	cod.	daN
-	TR	3020400006	1,45

Pivot coupler



mm	material	cod.	daN
-	TR	3020000006	1,73

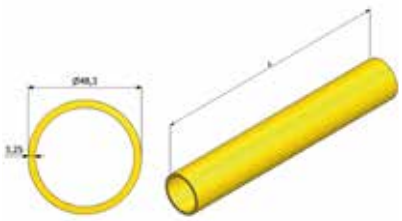
Simple coupler

mm	material	cod.	daN
-	TR	3020500006	0,69

Head coupler

mm	material	cod.	daN
-	TR	3020100006	0,94

Scaffold tube S235JR



mm	material	cod.	daN
-	ZZ	3010800035	3,45/ml

Pin

mm	material	cod.	daN
-	ZC	3030000001	0,63

Anchoring screw

mm	material	cod.	daN
-	-	3030200000	1,68

Steel caster

mm	material	cod.	daN
-	VR	3030300000	10,00

Instructions for use

Pre-erection

CHECKING THE TECHNICAL DOCUMENTATION

The documentation described in the following sections must be available on the work site at all times.
Some of the documentation will be provided by the scaffolding manufacturer and some by the authorized technician from the Company making use of the scaffolding.

Project
Full details of the scaffolding must be given and detailed erection designs must be attached containing construction details-where applicable-detailing:

- anchorages
- structural nodes
- load distribution at the base
- specific information regarding the correct erection of the scaffolding in question

The project must respect the regulations of the countries where the scaffolding is to be erected. For non-standard configurations or configurations higher than 20 m, it is suggested that a project signed and stamped by the authorized technician be drawn up.

Technical Report
The report must contain all static verifications that fall outside those described in the Ministerial Authorizations or standard designs.
It must be signed and stamped by an authorized technician.

Instruction manual and Anchorage manual
These are documents provided by the manufacturer to ensure correct use of its products.

CHECKING THE MATERIAL TO BE USED

The quality and quantity of all materials that are to be used must be carefully checked prior to use on site as described below.

Correspondence between materials used and those that have been authorized
The materials listed on the specifications and those that are on the work site must be checked to ensure they match. Using parts from scaffoldings made by other manufacturers is not allowed.
Mixed use of couplings/tubes that integrate with the scaffolding system is permitted. Each part of the scaffolding can be mounted separately from an adjoining part within a single system and joined to non-structural tubes/couplings.

Personal safety
All personal safety devices required by law must be available on the work site and utilized by the workers. ese devices are:

Safety belts
These must meet European regulation requirements, bear the CE marking and must have passed the prescribed technical testing.

Clothing
Working attire - overalls, gloves, shoes and all clothing must bear the CE mark and comply with EN 510 Cat.II. Standards.

Other provisions
A room or location should be set aside on the work site for first aid in the event of accidents. A first-aid kit must also always be on hand for immediate, preliminary assistance with injuries.

Material suitability
It is good practice on the work site to arrange for all parts of the scaffolding to be periodically examined to ensure that all is in working order.
For rented equipment, it is especially important that the end user company and the manufacturer of the rented equipment draw up a monitoring plan, paying particular attention to the following:
- *Checking the verticality of the uprights. Inclines greater than the manufacturer's declared dimensional tolerance are not acceptable.*

- *Checking the welding on prefabricated frames. Should a visual check raise concerns about the condition of a frame, use Magni ux or other similar penetrant liquid methods and/or discard the frame.*

- *Checking that the pawls and bushings for diagonal and transom couplings are working properly. Avoid using deformed and/or rebuilt elements.*

- *Checking the painted or galvanized surface protection. To ensure prolonged durability over time and depending on the location where being used, check all elements carefully to ensure there is no oxidation.*

- *Checking that the coupling grips (6 daNm) are tight, also checking the condition of the threads of the bolts being used.*
All nuts must always screw and unscrew perfectly.

- *Check that the metal ledger boards clamp together properly by making use of the device located on the planks for the purpose.*

- *Checking the straightness of the couplings used. Plastic deformations of any of the element that comprises the system are not acceptable.*

A compulsory check of the scaffolding soundness must be carried out a er each major climatic event. is can also include materials that have not yet been erected.

Storage on the work site
An area on the work site should be set aside for storing the scaffolding material to facilitate movement and organize the loading and unloading of material in the best manner possible, thereby reducing operational costs and the risks of accidents that are a common occurrence in disorganized environments.
For tall buildings, partial storage of quota material is advisable by making use of loading areas duly set up that can then be used even a er the scaffolding has been erected, thereby facilitating work on site. Materials should be stored in appropriate containers and storage chests. It is essential that a covered area also be made available (shed or alter- native) to bench-mount joints, or where checks can be carried out on materials.

Erection

During the erection stage, the mounting designs and the prescriptions issued by the Site Engineer must be scrupulously followed. As regards the stages of scaffolding erection, adhere to local regulations.
The main areas on which to focus attention during the erection stages follow.

STARTING POINT OF THE SCAFFOLDING

The elements described below must be carefully verified and checked.

Scaffolding bases

An outline of the scaffolding corresponding to the erection plan must be marked off.
The maximum distance from the building (20 m) must be respected and checked.
Should this not be possible, with the approval of the project designer or Works Director, add approach planks to the façade or guardrails even on the inner side.

Face

Before laying the bases, a suitable face must be prepared of coarse gravel and/or lean concrete if there are to be heavy loads at the foot, or, more generally, wooden approach planks must be laid out continuously, lengthways along the façade.

Controls at the foot of the scaffolding

It is good practice to at least carry out the following checks at the foot of the scaffolding:
• *Avoid placing more than 2 planks under the base.*

• *Always rivet the base plates to the planks.*

• *Check the screwing out of the base plates. Screwing out to a maximum of 20 cm is recommended. Greater screwing out is permitted as long as speci c technical veri cations have been carried out or additional cross bracings are added at the base of the sca olding.*

• *Check that the faces are level and that they are centered in relation to the bases.*

• *Check the correct distribution of loads at the foot of the sca olding, verifying the consistency, e ciency and proper placement of the distribution elements placed under the base plates (wooden planks, metal plates, concrete screw nuts, etc.).*

• *Check the correspondence between the start of the sca olding uprights in use against those in the erection design and especially the designs found in the system Ministerial Authorization Booklet. Should they not correspond, the technical documentation must be modi ed by modifying the project or, if necessary, modifying the erection depending on choices made for the project.*

SCAFFOLDING STRUCTURE

It is important that periodic checks be scheduled for the following:

Verticality of the uprights

The verticality of the uprights must be checked periodically. Inclines

other than those foreseen in the dimensional allowance designs of the system's elements are not permitted.
In the event that uprights are not parallel to a plumb line, they must be dismantled and erected again, if possible, or alternatively appropriate static verifications must be carried out that will guarantee that the specific scaffolding is suitable to fulfill the requirement for which it was initially intended.
Should dismantling and re-erection of the scaffolding not be possible, joints can be used to add a parallel reinforcing upright to the existing scaffolding.

Anchorages

Anchorages must be positioned every 22 square meters of scaffolding façade or, in special cases, in the number and in the positions shown in the erection plan. The type of anchorages, their functioning, the static verifications and the checks to be carried out are information that must be provided together with the technical documentation.

Access ladders

The rungs of the scaffolding ladders must conform to the requirements of the EN12811 standards, moreover the following must be checked:
• *The type of ladder must conform to regulation requirements and with what is described in the manufacturer's manual.*

• *A protective guardrail must always be installed.*

• *e ladders must be self-blocking and tted with anti-slip feet.*

Wood planks

Wood planks must always conform with what is shown in the design plan and, in particular, the following points must be carefully checked:
• *The planks must be free of traversing knots and in any event, the reduction of the reagent section areas must not be more than 10%.*

• *Declared minimum thicknesses must always be respected.*

• *Planks with overlaps (corners or changes of direction)must be appropriately riveted, above all in sca oldings where wooden joists are carrying the sca old (for example on loading mounts).*

Connections

As a minimum, the following must be checked:
• *Plugs: Plugs must be present and properly inserted in all the joints in the frame and loose uprights, and in all the items listed in the manufacturers' manual.*

• *Gudgeon pins: Plugs must be present and properly inserted in longitudinal tube joints when using the tube-coupler system.*

• *Wedge couplings: in multi-level systems in which wedge coupling connections are used, the correct insertion of the wedge into the node plate must be veri ed before proceeding with the erection of the next piece*

Grip of the joints

It is imperative that the correct grip of the joints (6 daNm) be checked with a torque wrench of all the structures or parts of particularly important structures:
• *projecting parts*
• *truss beams*
• *hoisting connections*
• *anchorages*

The checks must be carried out periodically, even while the scaffolding is in use, at intervals to be determined according to the use being made, but not longer than 2 months.
In any case, a check must be carried out following a major climatic event.

Metal ledger boards

The correct erection of the metal ledger boards must be checked, as must their detachment prevention locks, using a suitable device (a triangular rod or wedge).

Loading mounts

In cases where loading mounts with wooden scaffolding are used, the following must be checked:
• *Adherence of the trusses to the project speci cations regarding dimensions, number and position.*

• *In any case, position the trusses close to the structural nodes.*

• *Check the correct thickness and positioning of the wooden planks.*

• *Check that the planks are riveted to the trusses.*

• *Check that the work loads are compatible with those speci ed in the project.*

Service lifts to the scaffolding

When li s are installed, the proper positioning of the anchorage must be checked and above all that such anchorages are completely separate from those of the scaffolding.
If this is not possible, the special anchorages to be used must be covered by a report on the calculations, and by a specific erection plan showing the loads to be borne.

Protective sheets

In cases where protective sheets are used the following must first be ascertained:
• *Determine the sheet permeability to wind; the information should be provided by the manufacturer; if it is not, ascertain wind permeability experimentally, empirically or theoretically.*

• *Verify that the permeability coincides with that indicated in the calculation report. Should it not, adjust veri cations to the new loads and, if necessary, integrate the sca olding and anchorage structures.*

• *In such event, pay particular attention to check that the erection and functioning of the anchorages correspond with the designs and veri cations detailed in the designs.*

Winches and Pulleys

When winches or pulleys – even temporary – are used, the parts of the scaffolding affected by such equipment must be checked.
Thee checks must be shown on the calculation report if the equipment is also to be used during work execution.
The carrying capacity of the winch or pulley must always be visible and adjustable. In the absence of specific information in this regard, the following formula may be used to determine the dynamic increment of the vertical load in suspension for carrying out correct static checks:

φ = coefficiente di incremento dinamico
V = velocità del carico in movimento espresso in m/sec
φ = 1 + 0,6 x V

PERSONNEL SAFETY DURING INTERMEDIATE ERECTION STAGES

In addition to the prescriptions stipulated by local regulations, the main areas on which to focus attention are described below.

Scaffolding workers

Th scaffolding safety plan must have the names and specific responsibilities of the persons involved in organizing the work and erecting the scaffolding.

Holding and auxiliary cables

Check the correct positioning and use of the holding and auxiliary cables as prescribed by the regulations in force and check in detail the stipulations regarding their length and strength.

Use of personal safety devices

The correct use and efficiency of safety clothing having the characteristics already described in the 'Personnel safety' section must be checked periodically. The period is determined in relation to the duration of the work and of the personnel present on the work site.

Hoisting of materials

This is a dangerous phase of the works during which the following precautions must be taken:

• *Check the load capacity, the type and the correct functioning of the winch and the pulley. Also check the 'Winches and Pulleys' section regarding technical veri cations.*

• *Organize the work in such a way that there are never loads suspended above the heads of workers mounting the equipment.*

• *Check that the bay on which the raised material is to be stacked is suitable for carrying the weight. Check the technical speci cations and the calculation report to ascertain the projected technical capacities.*

Overlapping of personnel

Organize the erection teams in such a way that they are never positioned one above the other on the same part of the scaffolding.
While works are underway the scaffolding may undergo structural modifications due to the particular requirements of the work site not take into account during the planning stage.
It is important that the scaffolding be checked continually and that, as a minimum, the following are verified.

Overloads

In the event the end user requests unusual overloads, notices indicating the load capacity must be positioned on the scaffolding and checks that the assembled structure corresponds to the project design and the calculation report must be carried out.

Passive security elements

Periodically checks must be carried out to ensure that passive security devices have not been removed from the scaffolding; these include:
• *overhead and frontal guardrails*
• *frontal and overhead toeboards*

Planks with trapdoors must be shut if not in use.
The anchorages must never be removed unless such is called for under the work program and in the erection plan of the scaffolding.

Machinery present on the scaffolding

Unless otherwise prescribed, boring machinery, vibrators, compressors and whatever else could affect the stability of the scaffolding must not be used.
In the event the job calls for such type of machinery, check that the dynamic increase of the load has been taken into account in the calculation report.

Earthing

The presence and the type of earthing present on the scaffolding must be calculated in accordance with the regulations in effect.
In the same way the documentation relating to the machinery on the scaffolding must always be checked and brought up to date.

Dismantling

During dismantling, as during the erection stage, all precautions required by the regulations in force relating to safety equipment must be taken.
At the very least, the following areas must be checked.

Removal of passive safety devices

• *When dismantling the sca olding oor by oor, check that in the transitory stage, and a er the removal of the protective guardrails, no workers are present on that oor or at least that they are adequately protected with safety belts, holding and auxiliary cables on rigid parts of the structure such as done during the erection stage.*

• *During partial dismantling of the following piers, check that guardrails and the head toeboards are always reassembled.*

• *The movement of material disassembled from the sca olding must always be organized in a closed and safe manner. Storage of materials on the sca olding must be avoided at all times.*

Anchorages

• *Floor anchorages must only be disassembled a er having dismantled the overhead structure.*

• *Always check that at all times - including the dismantling stage of the sca olding - that no portions are higher than 4 m above the level of the last anchorage.*

• *Where there are projecting parts, the anchorages and the parts of the structure subject to pull must be dismantled working on the bay below.*

Storage

Set aside and display items which have been damaged or deformed.
On the ground, in an area of the work site that has been set aside (see 'Storage on the work site'), set aside all dismantled materials, organized by categories, tying them in bundles or putting them in their packaging to facilitate loading and transport.

Transport

Transport must be organized in detail analogous to the preceding phases and, as a minimum, paying particular attention the areas described below.

Supply

Transport must be staggered so that only the materials that are strictly necessary during the erection stage are on hand, thereby avoiding excessive stock piles within the worksite.
Check the size, the holding capacity of the delivery area as well as the rate at which the scaffolding is being erected (see 'Storage on the work site').

Materials

Check the correspondence between the projected supply quantity, the materials present on the worksite and those listed on the travel documents.

Returned materials

Returned material must be organized in containers by planks, frames and accessories so that the best use is made of available space and the number of journeys is kept to minimal.

Anchorages

General characteristics

JOINT CREEP STRENGTH

During static checks, creep strength must be considered and determined through crimp tests in officially and legally recognized laboratories:

- **Right-angle couplers with 4 bolts**

average resistance: Rm = 1915 daN

resistance at 5% fractile: R_5 = 1756 daN

permissible resistance: R = 1756/1,5 = 1170 daN

- **4-bolt right-angle coupler with holding joint**

average resistance: Rm = 2855 daN

resistance at 5% fractile: R_5 = 2717 daN

permissible resistance: R = 2717/1,5 = 1811 daN

CHARACTERISTICS OF THE MATERIALS USED

Materials having the geometrical and mechanical characteristics listed below are to be used:

Tube Ø 48.3 x 3.2 in S235JRH steel

A = 4,59 cm^2
J = 11,69 cm^2
W = 4,85 cm^3
i = 1,59 cm
σ 1 = 1600 daN/cm^2
σ 2 = 1800 daN/cm^2

LOADS

Load bearings are determined orthogonally and longitudinally on the scaffolding façade and those acting on the single anchorages in accordance with the regulations in force and the project calculation designs.

Determine:

F_1 = orthogonal load acting on the scaffolding façade and on the single anchorage

F_2 = longitudinal load acting on the façade of the scaffolding and on the whole scaffolding

SPLIT RINGS

The extraction strength of the split rings must be provided by the manufacturer and in any case it is a good rule to apply a safety factor of ϒ=1,5.

Ring properties to be requested from the manufacturer:

A_t= area of the leg of the ring on the wedge insert

W_t= resistance module corresponding to area A

σ = 1600 daN/cm^2 unless otherwise specified by the manufacturer

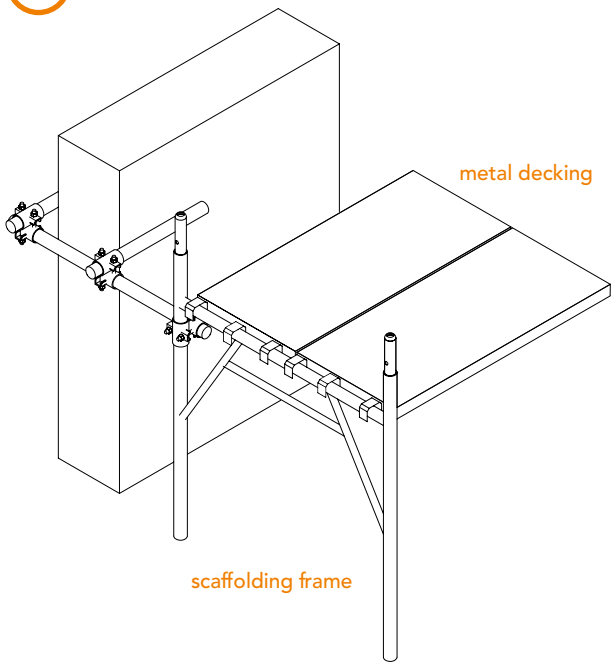
H= permissible resistance to the extraction of the ring using a safety factor of x 1.5 on the completed withdrawal value supplied by the manufacturer.

Tie anchorage

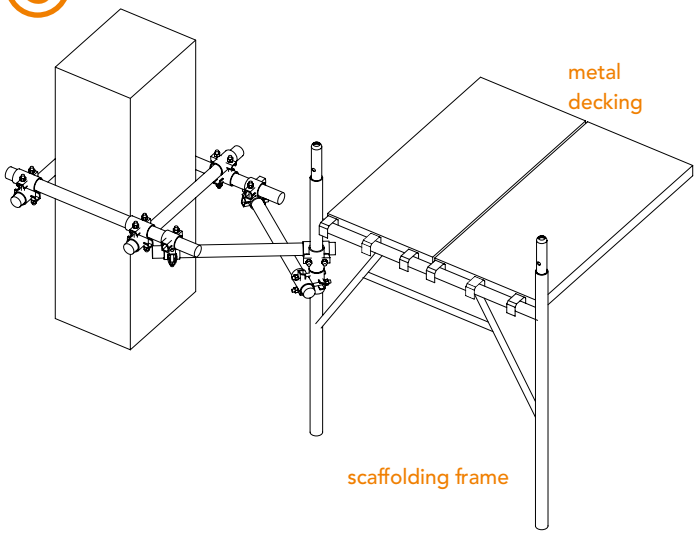
ERECTION PLAN

Effected according to the following layouts:

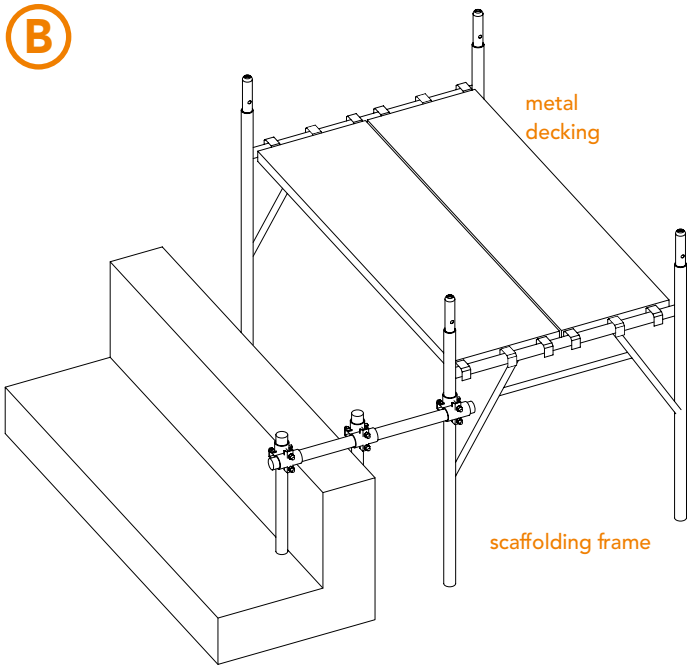
A



C



B



Tie anchorage

CHECKING THE ANCHORAGE SUBJECT TO AN F_1 LOAD

Checks to be carried out are the following:

• joint creep check:

$F_1 < R$

• tensile strength check of the anchorage tube:

$$\sigma = \frac{F_1}{A} < \sigma 1$$

• compression strength check of the anchorage tube

L = the free length of the anchorage tube

$$\lambda = \frac{L}{i}$$

The value of ω in relation to λ is determined according to regulations in force.

• instability check

$$\sigma = \omega \frac{F_1}{A} < \sigma 1$$

Should the instability check not pass the test, the anchorage tube must be sectioned making use of tube-couplers or the anchorage tube must be doubled.

CHECKING THE ANCHORAGE SUBJECT TO AN F_2 LOAD

The whole scaffolding's F_2 load can be absorbed by a number of C type anchorages strategically distributed on the scaffolding façade, but preferably, barring any obstacles, along the scaffolding outer piers.
Placing n the number of C type anchorages on the scaffolding, the acting load on each will be: $F^* = F_2/n$.

Load acting on a single anchorage tube with an inclination of α:

$$Fd = \frac{F^*/2}{\cos \alpha}$$

L= the free length of the anchorage tube

$$\lambda = \frac{L}{i}$$ from which is determined ω

$$\sigma = \omega \frac{F_d}{A} < \sigma 1$$

WARNINGS

When using tie anchorages, it is recommended to carry out the following:

• check the correct hold of the anchorage joints to ensure creep resistance;

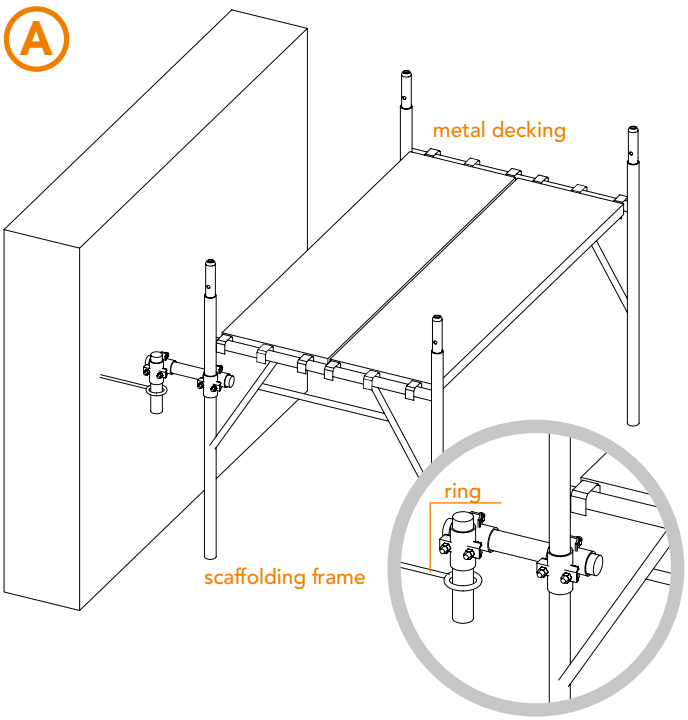
• connect the anchorage tubes in line with the structural nodes of the scaffolding;

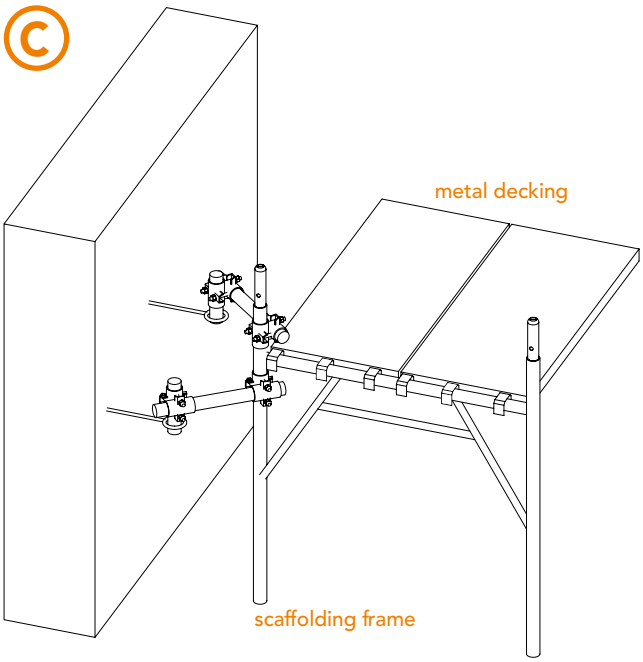
• insert wooden planks as load distributors between the tie anchorage tube side/edge and the structure of the building being worked on to avoid contact stress peaks (Hertzian pressure), which could otherwise be damaging to the structure.

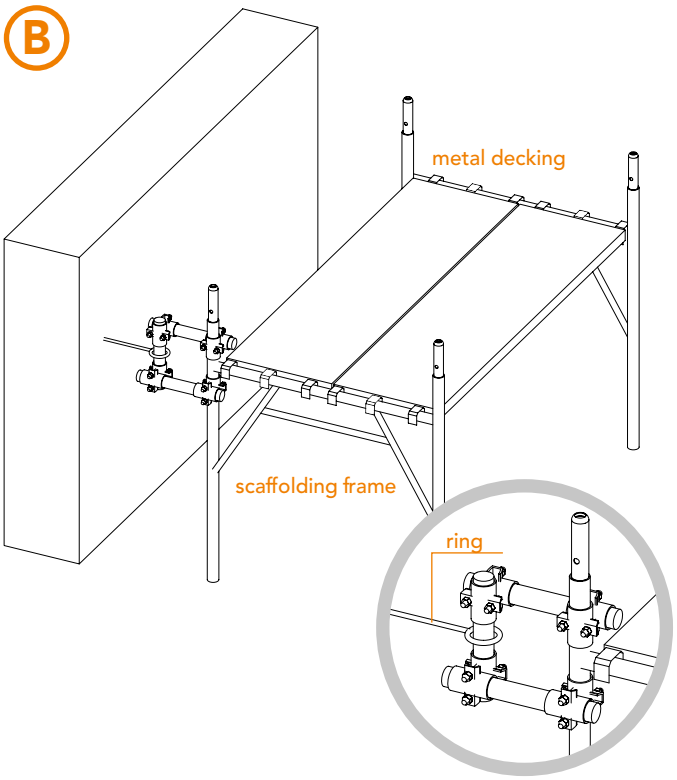
Ring anchorage

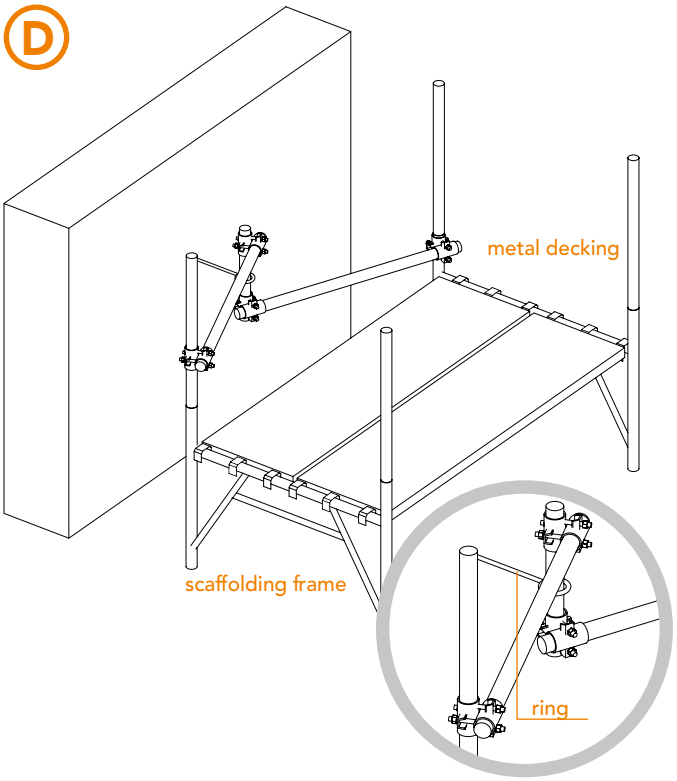
ERECTION PLAN

Effected according to the following layouts









Ring anchorage

CHECKING THE ANCHORAGE SUBJECT TO AN F_1 LOAD

The checks to be carried out are the following:

• joint creep check:

$F_1 < R$

• tensile strength check of the anchorage tube:

$$\sigma = \frac{F_1}{A} < \sigma^*$$

• tensile buckling of the anchor check:
consider a pull eccentricity on the anchor e=4 cm for A type anchorages.
Stress acting on the anchor:

Tensile stress: F_1

Bending moment: $M_1=F_1 \times e$
Verify:

$$\sigma = \frac{F_1}{A_t} + \frac{M_1}{W_t} < \sigma^*$$

• tensile stress check of the anchor
For symmetric type B anchorages, stress will be that of simple traction only:

$$\sigma = \frac{F_1}{A_t} < \sigma^*$$

• extraction check of the anchor

R_E= resistance to extraction as provided by the manufacturer of the anchors.

$$H = \frac{R_E}{1,5}$$ permissible resistance to extraction

Verify:

$F_1 < H$

CHECKING THE ANCHORAGE SUBJECT TO AN F_2 LOAD

F_2 loads as calculated in the 'Loads' section is divided on n number of C or D type anchorages.
Load acting on an individual anchorage:

$F^*= F_2/n$.

Load acting on single anchorage tube having an inclination of α:

$$Fd = \frac{F^*/2}{\cos \alpha}$$

• checking the anchorage tube:

L= the free length of the anchorage tube

$$\lambda = \frac{L}{i}$$ from which is determined ω

$$\sigma = \omega \frac{F_d}{A} < \sigma 1$$

• tensile buckling check of the anchor:

Tensile stress: F_d

Bending moment: $M = F_d \times e$
Verify:

$$\sigma = \frac{F_d}{A_t} + \frac{M_1}{F_d} < \sigma^*$$

WARNINGS

For ring anchors the following verifications are recommended:

• check the type and consistency of the wall and, according to the acting load, choose the most suitable type of anchor as supplied by the manufacturer.

• reduce the 'e' eccentricity of the joint between the anchorage tube and the anchor to the minimum possible.

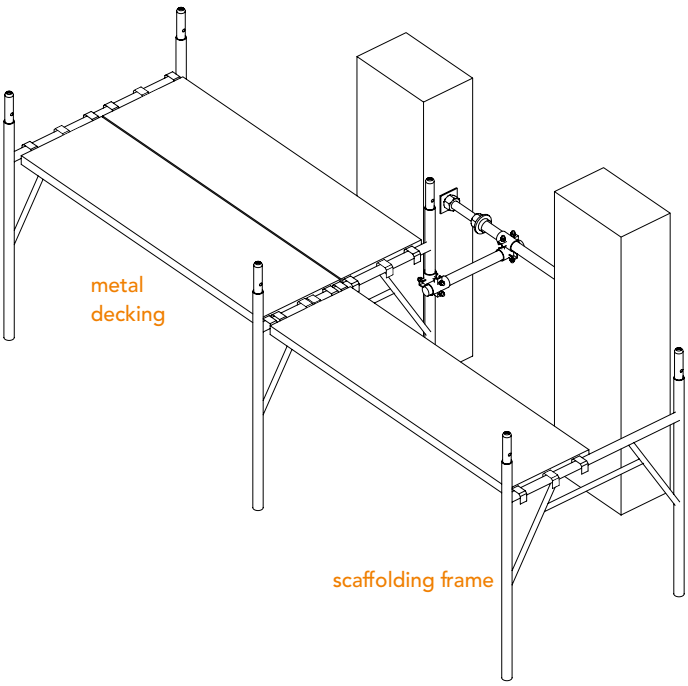
• check the correct hold of the joints.

• check the correct placing and working of the mounted anchors. In special cases, it is advised that extraction tests are carried out so that reliable values can be obtained of the actual resistance to extraction.

Anchorage with force screw

ERECTION PLAN

Effected according to the following layout



In special cases, when other types of anchorages are not permitted, force screws can be used, provided their working is checked and monitored while in use.
The risk in using these types of anchorages lies in the difficulty of determining the resistance that such anchorages can guarantee.

The resistance of the anchorage is in proportion to the force that the screw is able to ensure and to the friction coefficient lying between the wall and the force plate.
To correctly define the load of force, load cells placed the bases may be used. However, such a solution is costly and only justifiable for very particular types of work.

An alternative solution consists of determining whilst work is in progress the actual resistance RR on a trial anchorage and using a calculation of permissible resistance: $R_c=R_R/2$.

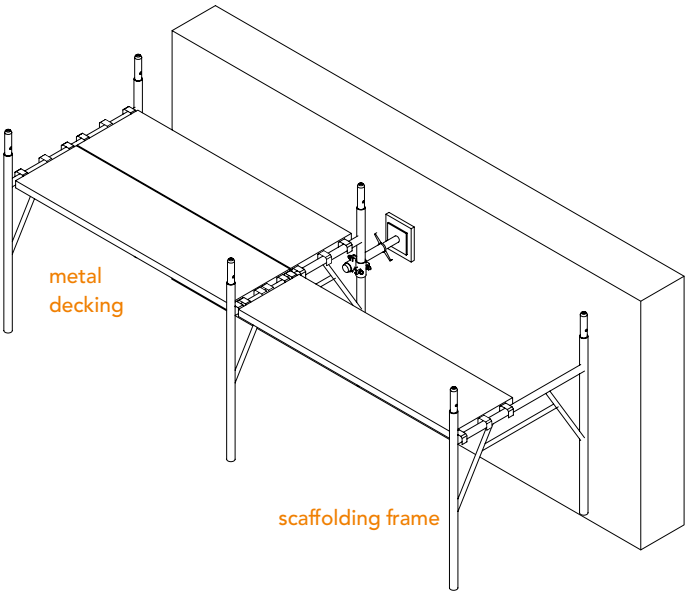
WARNINGS

It is recommended to connect the anchorage tube as near as possible to the force screw or at the extremity of the tube in order to avoid bending the tube itself.

Ancoraggio a sbadacchio

ERECTION PLAN

A monolateral constraint, resistant only to erected compression as laid out in the following diagrams.



LOADS

The bracing anchorage may only take orthogonal compression loads on the façade. The F_1 load acting on each orthogonal anchorage on the scaffolding façade is determined in accordance with the calculations detailed in the project and the regulations in force. The F_1 load can be made up of two addends:

$F_1 = F_{1a} + F_{1b}$

F_{1a}= compression component on the anchorage caused by orthogonal wind pressure on the scaffolding façade

F_{1b}= compression component on the anchorage arising from the structural geometry. For example, the horizontal component of the load carried by the brace of the jutty, shown in 'Erection plan - Bracing anchorage".

CHECKING THE ANCHORAGE SUBJECT TO AN F_1 LOAD

The checks to be carried out are the following:

• **joint creep check:**

$F_1 < R$

• **compressive strength check of the anchorage tube:**

L = free length of the anchorage tube

L

Bracing anchorage

$\lambda = \frac{}{i}$ from which ω is derived from the tables of existing standards and regulations.

Checking instability

$$\sigma = \omega \times \frac{F_1}{A} < \sigma 1$$

• compressive strength check of the regulating screw
Limit the screwing out of the screw within a maximum of 15 ÷ 20 cm in order to omit factors of instability and only carry out resistance checks.

$$\sigma = \omega \times \frac{F_1}{A} < \sigma 1$$

• check the wooden planks distributors
Place a wooden plank underneath the base of the regulating screw to act as a load distributor

S = 5 cm plank thickness
A_L = 400 cm² 20 x 20 cm plank
σL = 60 daN/cm² permissible stress on the wooden plank

Resistance check:

$$\sigma = \frac{F_1}{Al} < \sigma_L$$

WARNINGS

For bracing anchorages, it is recommended to carry out the following:

• check the correct positioning, the quality and the efficiency of the wooden planks under the base acting as the load distributors

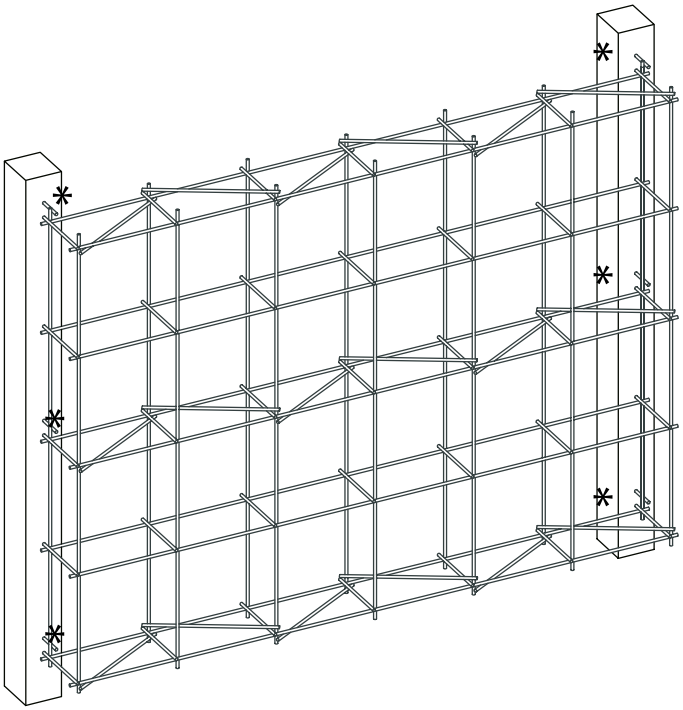
• limit the screwing out of the regulating screw to never exceed 20 cm

• check the proper dismantling of the joints so as to guarantee creep resistance.

Truss beam in tube-coupler anchorage

ERECTION PLAN OF HORIZONTAL BEAMS

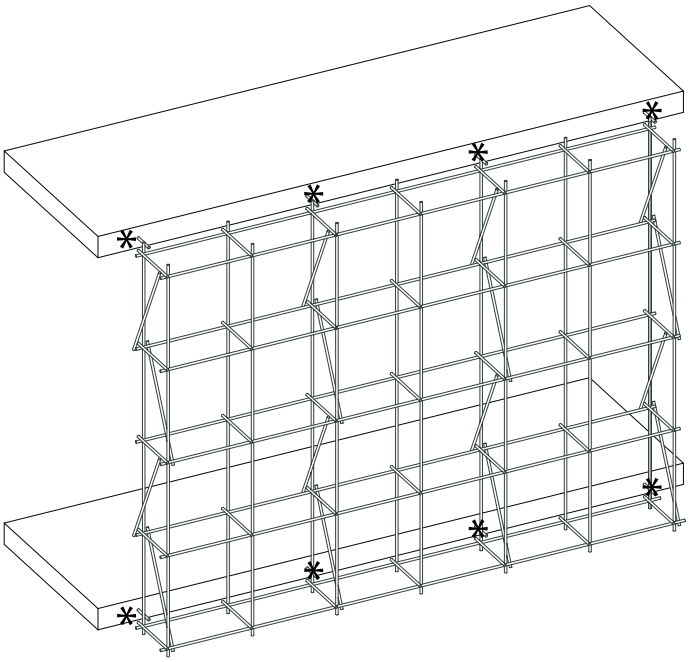
For buildings under construction with framed structures in reinforced concrete or steel, or for building maintenance with large areas of glass, it is not possible to distribute the anchorages uniformly on the façade of the scaffolding. In such cases, truss beams in tube-couplers can be used laid out horizontally or vertically on the inside of the scaffolding framework in such a way as to disperse the wind pressure on to the anchorages at the end of the truss beams only.



* Typical anchorage

ERECTION PLAN OF VERTICAL BEAMS

Truss beams can be erected on every bay or on alternate bays to act as loads.
Truss beams can be mounted on alternating piers or on all the piers to act as loads, and especially depending on whether or not metal ledger boards are present on each bay acting as braces and, therefore, as horizontal load distributors.



* Typical anchorage

Truss beam in tube-coupler anchorage

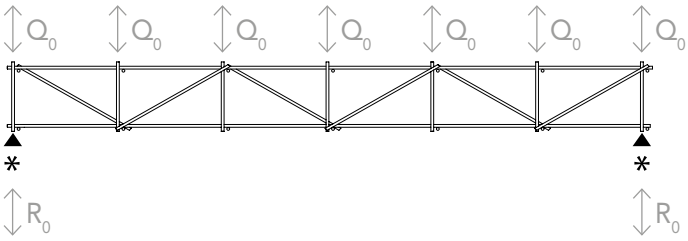
LOADS

The wind pressure (Pw) is calculated according to the regulations and standards in force and the project diagrams applicable to the scaffolding surface exposed to the wind. The nodal load acting on the truss beam anchorages must be calculated.

• **horizontal truss beam**
For example for diagram No. 1 in the 'Truss beam in tube-coupler anchorage' section, there must be 2 modules on every node.
The result is the following:

$Q_o = P_w \times 2S_w$

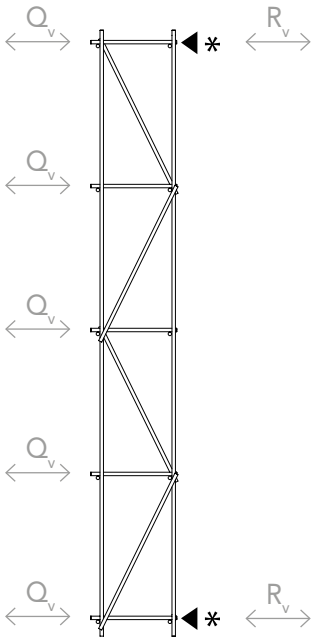
A static layout of horizontal truss beam anchorages:



• **vertical truss beam**
For example, in design no. 2 in the "Truss beam in tube-coupler anchorage' section, there must be 2 modules on every node. The result is the following:

$Q_v = P_w \times 2S_w$

Static diagram of the anchoring vertical truss beam



CHECKING THE TRUSS BEAMS

Having defined the acting loads and the static diagrams as explained in the previous section, proceed with defining the truss beams using the Ritter method or models utilizing finished elements or whatever other methods are available for the purpose of obtaining the maximum stress loads:

Tmax = maximum shear action
Mmax = maximum bending moment

• **horizontal anchorage beam**
Use tubes of ∅ 48.3 x 3.2 steel 235JRH for constructing the beams described in the previous sections.
Both the transoms and the diagonals of the beans are added to the scaffolding structure and immediately laid underneath the metallic decking which forms the work bays.
Such beam elements will therefore only be subject to loads arising from the results of the preceding sections.
Therefore resistance and instability checks are carried out on the transoms and diagonals most subject to stress.

• **vertical anchorage beams**
The diagonals are made of tubes ∅ 48.3 x 3.2 in S235JRH steel coupled to the transoms with swivel joints, while the beam transoms take advantage of the scaffolding uprights.
The resistance and instability checks of the scaffolding uprights must therefore take into account both the vertical loads of traditional scaffolding on the uprights and the loads consequent to the bending moment acting on the vertical truss beam.

ANCHORAGES OF THE EXTREMTIES

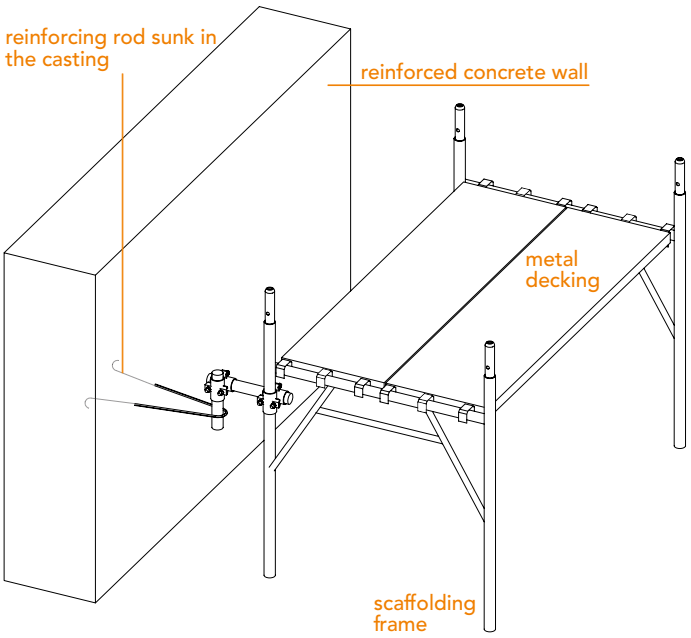
Every truss beam must be anchored to the part it is serving.
Refer to the anchorage types already described and see previous section for the checks that have to be carried out.

WARNINGS

It is recommended to check the following:
• check the tightening torque of the joints
• check for the presence of metal ledger boards on bays which act as horizontal load dividers
• depending on the type of anchorages placed on the end of the truss beams, see the applicable warnings that apply to each under 'Warnings'.

Anchorage with reinforced rod for reinforced concrete

ERECTION PLAN



CHARACTERISTICS OF THE MATERIALS USED

Materials having the geometrical and mechanical characteristics listed below are to be used:

Tube ∅ 48.3 x 3.2 in S235JRH steel

A = 4,59 cm²
J = 11,69 cm²
W = 4,85 cm³
i = 1,59 cm
σ 1 = 1600 daN/cm²
σ 2 = 1800 daN/cm²

Tonde ∅ 8 FEB44K steel reinforcing rod for reinforced concrete

σ A = 2.600 daN/cm²
σ A = 0,5 daN/cm²

LOADS

The type of anchorage is only capable of supporting orthogonal loads to the facade. For loads parallel to the façade, other types of anchorages must be used as described above.
F1 load are determined in accordance with the regulations in force and the calculation designs of the project.

CHECKING THE ANCHORAGE SUBJECT TO AN F_1 LOAD

The checks to be carried out are the following:
• **joint creep check:**

$F_1 < R$

• **tensile strength check of the anchorage tube**

$$\sigma = \frac{F_1}{A} < \sigma 1$$

• **reinforcing rod check**
The type of concrete and its characteristic Rbk resistance should be considered;
in the absence of such information, assume Rbk= 250 daN/cm²
Based on the Rbk, the regulations in force provide the value of the resistance to adhesion of the reinforcing rod (τco).
The resistance to adherence of the rod in the concrete (R_A):

∅ = reinforcing rod diameter

L' = length of each of the 2 sections of reinforcing rods present within the concrete casting

τco = concrete adherence resistance

$R_A = (\varnothing \times \pi \times L' \times 2) \times \tau$

• **adherence of the rod in the concrete check**
$F_1 < R_A$

• **strength check of the reinforcing rod**

$$\sigma = \frac{F_1}{2 \times A_A} < \sigma_A$$

WARNINGS

The following is recommended:

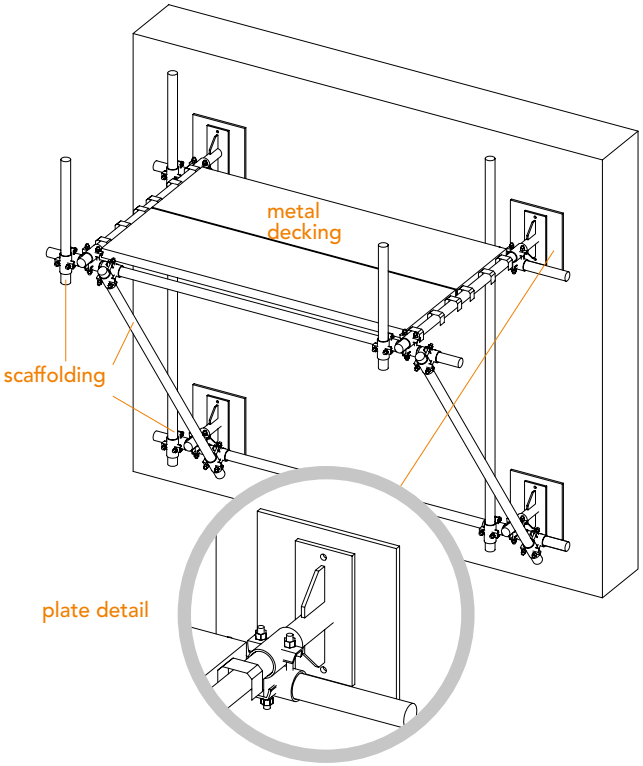
• check the correct positioning of the rod in the concrete and the technical/geometric properties (Φ ; A_A)

• check the correct hold of the joints.

Anchorage with structural steel plates

ERECTION PLAN

In the event of there being a particular geometry to the scaffolding (suspended bearing) and/or particularly high loads, a steel plate joined to the wall with mechanical anchors can be used.



CHARACTERISTICS OF THE MATERIALS USED

Materials having the geometrical and mechanical characteristics listed below are to be used:

Tube ∅ 48.3 x 3.2 in S235JRH steel
A = 4,59 cm^2
J = 11,69 cm^2
W = 4,85 cm^3
i = 1,59 cm
σ 1 = 1600 daN/cm^2
σ 2 = 1800 daN/cm^2

Anchorage with structural steel plate; S235JR steel
Should ribbing be found, the geometric/mechanical properties to be taken into consideration are:
Ap = reagent area of the ribbing section
Wp = resistant module of the ribbing section
σ 1 = 1600 daN/cm^2
σ 2 = 1800 daN/cm^2

LOADS

The acting load on the anchor plate is transmitted by the ledger or by the upright that is directly attached to it.

In general and in particular for the layout shown in 'Anchorage with structural steel plate', the vertical load applied by the scaffolding uprights must be added to the wind element.

CHECKING THE ANCHORAGE PLATE

With reference to the erection diagram and the 'Anchorage with structural steel plate' loads, carry out resistance checks on the plates acting as loads:

• **upper plate:**

$T = N_i$ $\quad N = N_i \times e$

resistance check

$$\sigma = \frac{M}{W_p} < \sigma 1$$

$$\tau = \frac{T}{A_p} < \pi 1$$

$$\sigma id = \sqrt{\sigma^2 + 3\,\pi^2} < \sigma 1$$

• **lower plate**

$T = N_e$ $\quad N = H$ $\quad M = N_e \times e$

verification of the anchors

$$\sigma = \frac{N}{A_p} + \frac{M}{W_p} < \sigma 1$$

$$\tau = \frac{T}{A_p} < \pi 1$$

$$\sigma id = \sqrt{\sigma^2 + 3\,\pi^2} < \sigma 1$$

• **verification of the anchors**

The loads acting on the single anchors are:

$$Tb = \frac{T}{2}$$ shear on the single anchor

$$Nb = \frac{M}{d}$$ shear on the single anchor

The Tb and Nb values must be compared with the bearing capacities of each anchor as supplied by the maker, reduced by the safety coefficient 2.2.

Erection sequence

Connection elements

Bushing fittings - Real Pont system

Pawl fittings - Tel Dal system T5

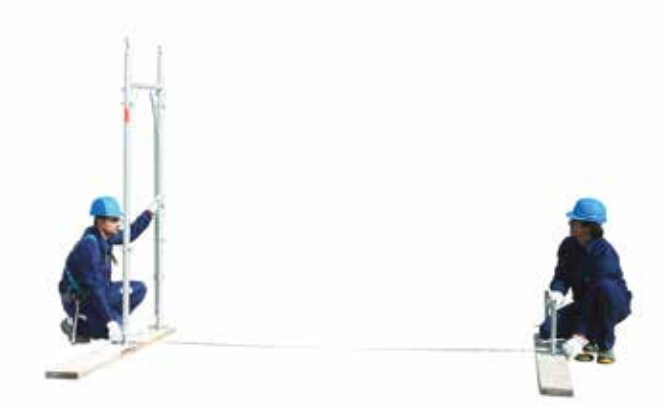
Pawl fittings - Uniform system

Pawl fittings - Tel Dal H system

Erection sequence

1 • positioning the base

2 • positioning the frames



3 • leveling the base

4 • inserting the ledger

5 • erection second frame with guardrail

6 • erecting the second ledger

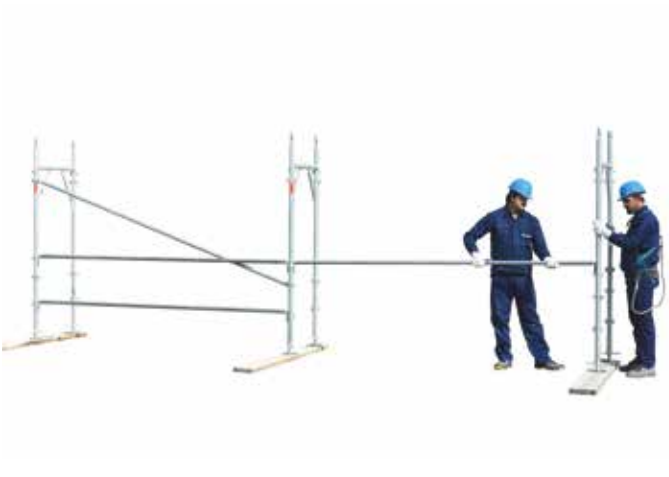
Erection sequence

7 • erecting the vertical-diagonal brace

8 • checking the level

9 • checking the distance from the facade

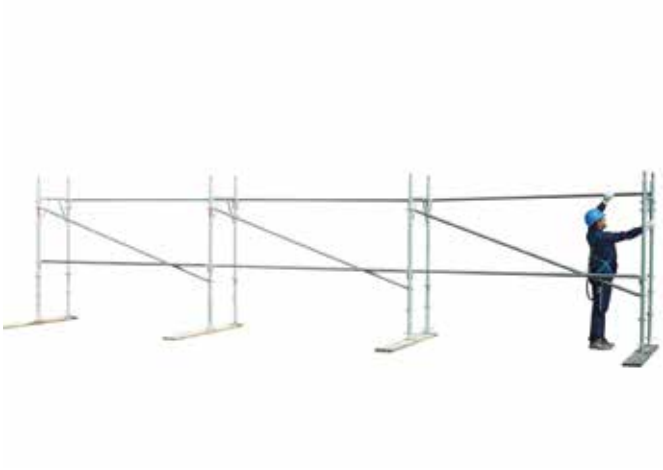
10 • checking the level



11 • erecting the next modules

12 • erecting the next modules

Erection sequence



13 • erecting the next modules

14 • inserting the anchorage

15 • inserting the anchorage

16 • erecting metal ledger boards

17 • erecting metal ledger boards

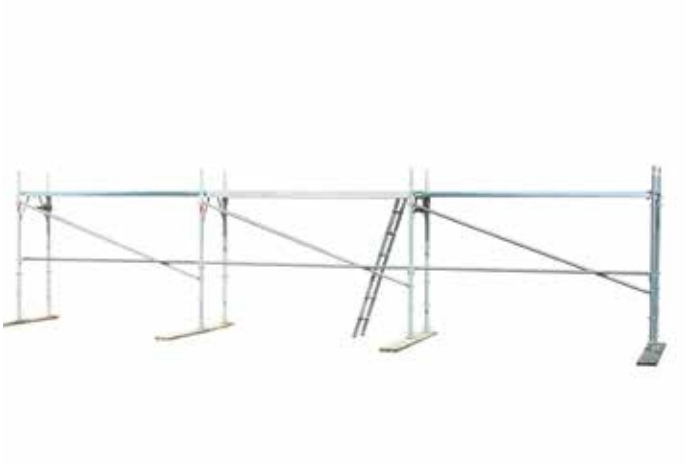
18 • erecting plank with trapdoor

Erection sequence

19 • erecting plank with trapdoor

20 • ladder of the plank with trapdoor

21 • inserting the ladder of the plank with trapdoor



22 • first level

23 • passage to the upper level

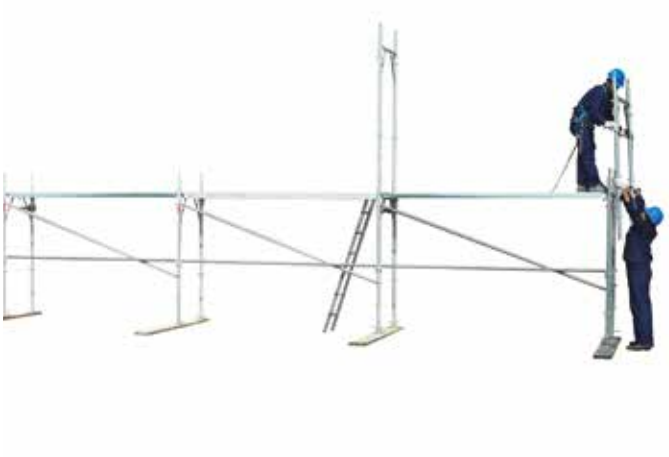
24 • attaching the holding cable before mounting the bay

Erection sequence

25 • closing the trapdoor

26 • start of frame erection of level 1

27 • erecting level 1 frame



28 • erecting level 1 frame

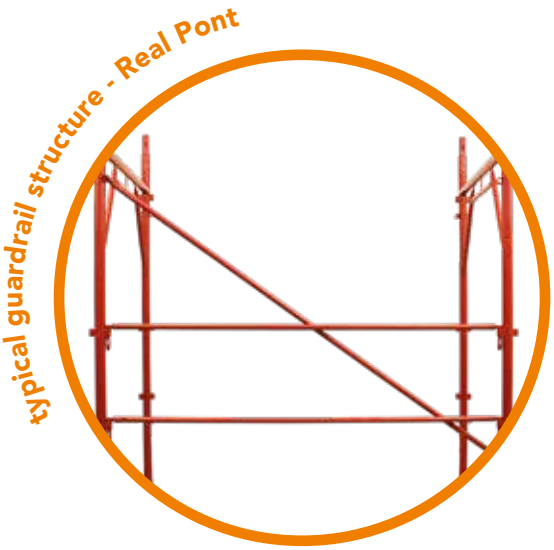
29 • erecting frame pins

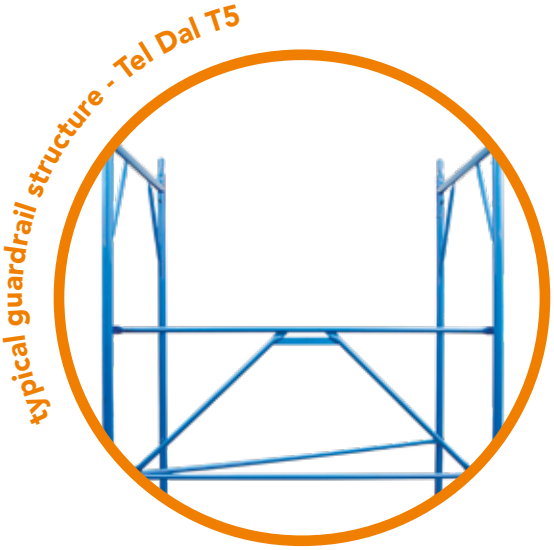
30 • erecting the level 1 ledger

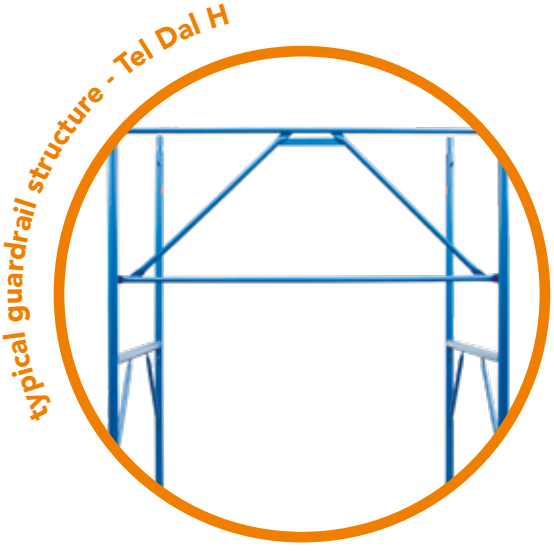
Erection sequence

31 • erecting 1st level guardrail

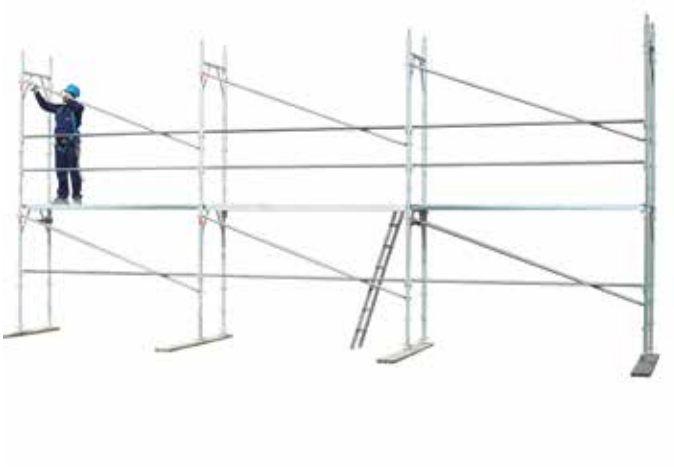
32 • erecting the level 1 vertical-diagonal brace







Erection sequence



33 • erecting the next level 1 modules

34 • erecting the level 1 rear ledger

35 • erecting the level 1 toeboard

36 • level 1 toeboard detail

37 • level 1 toeboard detail

38 • erecting the level 1 toeboard

Erection sequence

39 • erecting 1st level side fencing

40 • erecting 1st level side fencing

41 • erecting an anchorage on level where needed

42 • erecting the level 2 planks

43 • erecting the level 2 planks

44 • erecting the level 2 planks with trapdoor

Erection sequence

45 • erecting the level 2 planks with trapdoor

46 • erecting planks on all level 2 modules

47 • erecting top upright on level 2

48 • erecting top upright joint on level 2

49 • passage to the level 2

50 • erecting transoms and guardrails on level 2

Erection sequence

51 • erecting 2nd level side fencing

52 • erecting street protection guard

53 • street protection guard detail

54 • street protection guard detail

55 • erecting street protection guard planks

56 • erecting street protection guard planks

Erection sequence

57 • street protection guard planks detail

58 • erecting bracket brace

59 • erecting plank bracket brace

60 • erection of the plank with bracket brace

61 • erecting the planks on the brackets

62 • erecting the planks on the brackets

Erection sequence

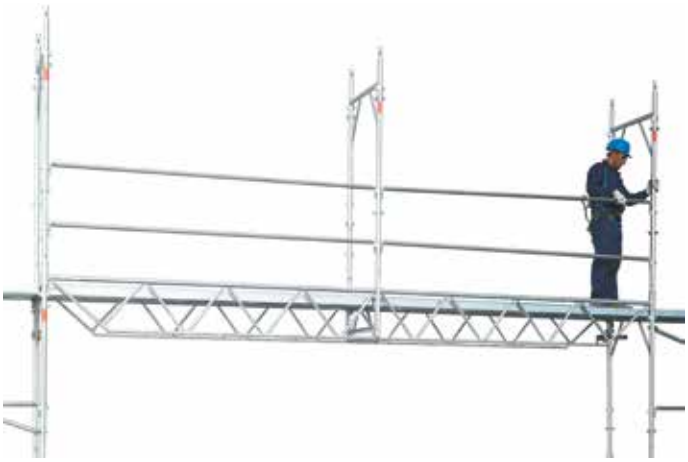
63 • erecting the connections of the pedestrian walk-through frame

64 • erecting the planks on the pedestrian walk-through frame

65 • erecting carriage beams

66 • erecting carriage beam connecting beams

67 • erecting decking on the carriage beam



68 • erecting frames and transoms above the carriage beams

Erection sequence

69 • erecting the vertical-diagonal brace above the carriage beams

70 • end of erection above the carriage beams

Certifications

Tube-coupler system

CNAS - MCC
Test report
no. 2009-52558

Steel tube scaffold
couplers

China

ICECON
Certificat
de conformitate
nr. 0835/2017

Schele de fațadă,
din oțel T/C

Romania

IGQ
Certificati di prodotto
P021A

Ponteggio metallico fisso
a tubi e giunti

Italy

Technischen
Universität München
Prüfbescheinigung
gemäß DIN EN 74

Rohr-Kupplungs-
System 9466

Germany

Prefabricated frames: Realpont 75 system

CNAS - MCC
Test reports no. TC-JG1-
Q-2009-09 ; 15; 16; 17; 18.

Frame Realpont 75
Horizontal diagonals
Bracket, Bridging ledger

China

ICECON
Certificat de conformitate
nr. 0834/2017

Schele de fațadă,
din oțel RP 75

Romania

IGQ
Certificato
di prodotto P021I

Realpont 75 a telai
prefabbricati

Italy

Prefabricated frames: Realpont 105/EU92 system

CNAS - MCC
Test reports no. TC-JG1-
Q-2009-08; 15; 16; 17; 18.

Frame Realpont 105
Horizontal diagonals
Bracket, Bridging ledger

China

ICECON
Certificat de conformitate
nr. 0834/2017

Schele de fațadă,
din oțel RP 105

Romania

IGQ
Certificati di prodotto
P021H, P021L

Realpont 105/EU92
a telai prefabbricati

Germany

Prefabricated frames: Tel Dal T5/Uniform system

ICECON
Certificat de conformitate
nr. 459/2007

Schele de fațadă,
din oțel T5

Romania

IGQ
Certificati di prodotto P021D

Tel Dal 3, Tel Dal 5 bis,
Tel Dal 5 ter

Italy

ICECON
Certificat de conformitate
nr. 0836.1/2017

Schele de fațadă,
din oțel Uniform

Romania

IGQ
Certificati
di prodotto P021F

Uniform a telai
prefabbricati

Italy

Prefabricated frames: Tel Dal H system

IGQ
Certificati di prodotto
P021E

Tel Dal H a telai
prefabbricati

Italy

IGQ
Certificati di prodotto
P021B

HTP a telai prefabbricati

Italy

IGQ
Certificati di prodotto
P021C

PRATICUS a telai prefabbricati

Italy

IGQ
Certificati di prodotto
P021M

RP 390 a telai prefabbricati

Italy

IGQ
Certificati di prodotto
P021N

RP 490 a telai prefabbricati

Italy

IGQ
Certificati di prodotto
P021O

T5-SX a telai prefabbricati

Italy

Deck planks

CNAS - MCC
Test report
no. TC-JG1-Q-2009-10

Metal plank mm 330x1800

China

CNAS - MCC
Test report
no. TC-JG1-Q-2009-11

Metal plank mm 330x2500

China

CNAS - MCC
Test report
no. TC-JG1-Q-2009-12

Metal plank mm 490x1800

China

CNAS - MCC
Test report
no. TC-JG1-Q-2009-13

Metal plank mm 490x2500

China

sturdischiesa • September 2019 - EN

MARCEGAGLIA
BUILDTECH

Registered seat:
via Bresciani 16 • 46040 Gazoldo degli Ippoliti (MN) - Italy
phone + 39 . 0376 6851
www.marcegagliabuildtech.it

Main offices and plant:
MARCEGAGLIA Graffignana
via S. Colombano, 63 • 26813 Graffignana (LO) - Italy
phone + 39 . 0371 20681
cantieristica@marcegaglia.com