

FORMWORK MANUAL

*for professional use of building aids in compliance
with safety regulations*



Safe Working Practices on the Construction Site



Schalsysteme · Formwork systems

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Introduction

The erection of provisional building aids for pouring concrete in accordance with the European guidelines on health and safety at work, which regulate the programming of operations, can only be done with careful analysis of the various operations, so that day-to-day procedures can be planned in compliance with safety requirements.

The **“MAXIM SYSTEM”** concrete formworks enable different geometric configurations to be assembled. There is a tendency towards using standardized modules in order to reduce movements and any alterations that become necessary as a result of different configurations (corners, intersecting walls etc.) to a minimum.

These aspects are of great importance, as they make it possible to optimise working procedures and to tackle safety issues in the best possible manner.

The guidelines contained in this handbook relate particularly to the installation, use and disassembly of the formwork panels in which the concrete is contained during pouring and curing.

In order to check that the MAXIM SYSTEM panels and components conform with the safety requirements specified by the European legislation on health and safety at work and specifically for the construction sector (Council Directive No. 92/57, transposed into Italian law by legislative decrees 494/96 and 528/99), they were subjected to a number of laboratory examinations at the Polytechnic Institute of Milan (Department of Civil Engineering).

Testing:

- a) Mechanical characteristics of the materials
- b) Load tests on flat panels
- c) Load and tensile tests on different components (work accessories and/or additional accessories)

Description of the results in accordance with CERTIFICATION No. 99/0027/005 dated 24.04.99.

Interfama concrete formwork "MAXIM SYSTEM"

Panel formwork for walls of up to 6 metres in height with complex configurations:



Linear formwork



Sloping walls



Circular formwork



Corner formwork



Supporting walls (single-sided forming)

For walls with a height of more than 6 metres with repeated pouring of concrete using climbing platforms

Dimensional Characteristics of the Components

Panels



300 x 200 cm, 300 x 100 cm, 300 x 75 cm, 300 x 60 cm, 300 x 50 cm, 300 x 40 cm, 300 x 30 cm, 300 x 20 cm

Corners



Compensation plates



Head closing



Technical data:



Frames made of steel sections.
(Reference standard UNI 7810)



Frames made of aluminium alloy sections.
(Reference standard UNI 8634)

Corrosion protection using the following methods:

- **Class C2 – coating in accordance with EN 39**

The frame cladding consists of multilayered birchwood panels that are bonded in accordance with Class **D4 – EN 2004** and sealed with a layer of phenol applied at a rate of 220g/m². The structure of the walls is homogenous; the surfaces are completely smooth.



Accessories

- for joining the frames as well as ensuring their alignment with the aim of erecting formwork parts that meet the specifications of the work plan;
- for joining two opposing wall elements, in order to counteract the force of the concrete;
- as an end piece on the concrete formwork in order to ensure correct usage under the strictest safety requirements.



Panel clamp provides a horizontal joint between adjacent formwork parts. Also used for alignment purposes.



External corner clamp enables two panels forming a right angle (external corner) to be joined.



Stacking clamp guarantees the alignment of adjacent, stacked panels taking the geometric characteristics of the modules into consideration.



Galvanised connecting rod joins two opposing wall surfaces and counteracts the force of the concrete.



Clamp for corner/column joins two panels that are positioned at right angles to one another (external corner).



Wingnut with threaded rod
Wingnut for tightening the connecting rods, ensures that the gap between two wall elements is maintained.

Additional Accessories



Scaffolding brackets are attached to the frame and enable the erection of walkways and work platforms.



Scaffolding bracket end piece
lateral end piece for scaffolding brackets; secures the ends of the scaffolding platform.



Two way adjustable props

Firstly as telescopic props with securing pins, secondly as push-pull props, with an additional arm in order to make a second joint with the formwork and strengthen it.



Adjustable clamp

for joining two adjacent wall elements between which there is a compensating space.



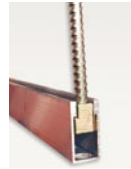
Cross bar for circular formwork

adjustable clamp for the erection of circular walls. Maximum angle 15°.



Crane hook

is attached to the reinforcement edge profile so that it can be handled.



Anchor rail connector

to enable the panels to be securely attached and to ensure a strong bond between rails and concrete.

Assembly

It is advisable to set up a working area with lifting equipment in order to carry out the assembly work. Put together the frame elements as set out in the operational procedures.



Installation

Position the first wall panels along the wall route and ensure that they are firmly set in place using the props.

In particularly difficult situations such as if there is a lack of space or there are obstacles in the way, the stability of the wall should be safeguarded using the anchor rail connectors.



Service platforms

The Scaffold brackets are attached to the second wall panel's frame at the points provided. These enable the temporary erection of walkways that are required in order for the work to be carried out and which fulfil safety requirements. The distance between them may not exceed 1.80 metres.

The walkway consists of at least 4 cm thick boards that are positioned and fastened down so that they cannot tip up. Wherever possible, the gap should be maintained at 1.80 metres; the walkway can be composed of steel



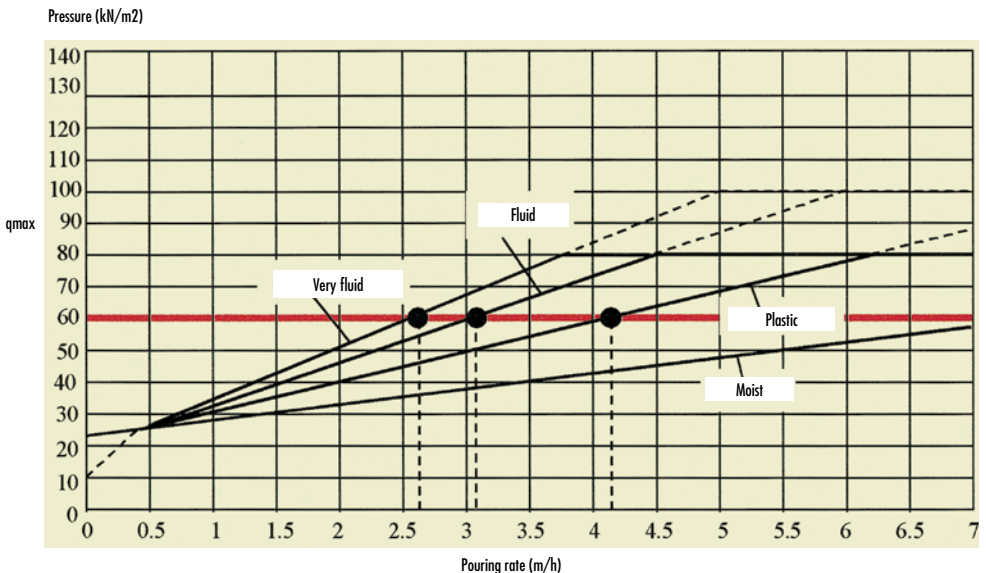
plates (such as are commonly used for metal bridges), provided that they conform to the provisions of the ministerial circular (Italian Presidential Decree Amendment 164/956).

Handrails and lateral end pieces are fixed to the supporting fittings that are specially provided on the brackets.

Pouring rates

The Interfama concrete formwork "MAXIM" has a load bearing capacity of **60 kN/m²**.

Diagram for determining the pressure of the concrete as a function of the pouring rate:



Handling

If formwork parts are moved using mechanical equipment such as cranes or the telescopic arms on lifting gear, it is important to adhere to the following instructions:

- the crane hooks (claws) must be attached so that the weight of the panels is precisely balanced.
- the anti-lift out devices must be safely fastened in place.
- the angle of the ropes (loops, chains etc.) that connect the formwork to the lifting gear must not exceed 45°.
- the crane hooks and the equipment used for moving the panels must be



stamped with the **CE** standard mark and show their carrying capacity.

- when moving the panels in windy conditions the parameters detailed in the table below (wind speed: reach m^2/t of the load) must be taken into account.

TABLE - HANDLING

Reach	14	15	17	20	22	25	25	27	30	32	35	37	40	42	45	47	50	52	55	57	60
Load curve (in t)	8	7,3	6,3	5,2	4,6	4	4	3,7	3,2	3	2,7	2,5	2,2	2,1	1,9	1,8	1,65	1,56	1,45	1,35	1,25
S (in m ²)	Maximum permissible wind speed (in km/h)																				
1	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72
2	72	72	72	72	72	72	72	72	72	72	72	72	72	72	70	68	65	63	61	59	57
3	72	72	72	72	72	72	72	72	72	72	68	66	62	60	57	56	53	52	50	48	46
4	72	72	72	72	72	72	72	69	64	62	59	57	53	52	50	48	46	45	43	42	40
5	72	72	72	72	69	64	64	62	58	56	53	51	48	47	44	43	41	40	39	37	36
6	72	72	72	67	63	59	59	57	53	51	48	46	44	43	41	39	38	37	35	34	33
7	72	72	68	62	58	54	54	52	49	47	45	43	40	39	38	37	35	34	33	32	30
8	72	69	64	58	55	51	51	49	46	44	42	40	38	37	35	34	33	32	31	30	28
9	68	65	60	55	51	48	48	46	43	42	39	38	36	35	33	32	31	30	29	28	27
10	64	62	57	52	49	46	46	44	41	39	37	36	34	33	31	31	29	28	27	26	25
11	61	59	54	50	47	43	43	42	39	38	36	34	32	31	30	29	28	27	26	25	24
12	59	56	52	47	45	42	42	40	37	36	34	33	31	30	29	28	27	26	25	24	23
13	56	54	50	46	43	40	40	38	36	35	33	32	30	29	28	27	26	25	24	23	22
14	54	50	48	44	41	38	38	37	34	33	32	30	29	28	27	26	25	24	23	22	22
15	53	50	47	42	40	37	37	36	33	32	31	29	28	27	26	25	24	23	22	22	21
16	51	49	45	41	39	36	36	35	32	31	30	28	27	26	25	24	23	22	22	21	20
17	49	47	44	40	37	35	35	34	31	30	29	28	26	25	24	23	22	22	21	20	20
18	48	46	43	39	36	34	34	33	30	29	28	27	25	25	23	23	22	21	20	20	19
19	47	45	41	38	35	33	33	32	30	29	27	26	25	24	23	22	21	21	20	19	18
20	46	43	40	37	35	32	32	31	29	28	26	25	24	23	22	22	21	20	19	19	18

S = Surface area of the load to be moved in m²

Climbing platforms foldings

(for heights of over 6.0 metres)

For operations that require repeated concrete pouring, the climbing platforms allow the repositioning of the formworks in order to pour the concrete to the required fill heights.

The procedure is made up of the following steps:

- a) simple fitting of the formwork to the platform on the brackets;
- b) Installation of the props in order to secure the temporary join between the formwork and the platform;
- c) Fitting of the anchoring devices for the bracket suspension connections (required for the next stage in the operation).

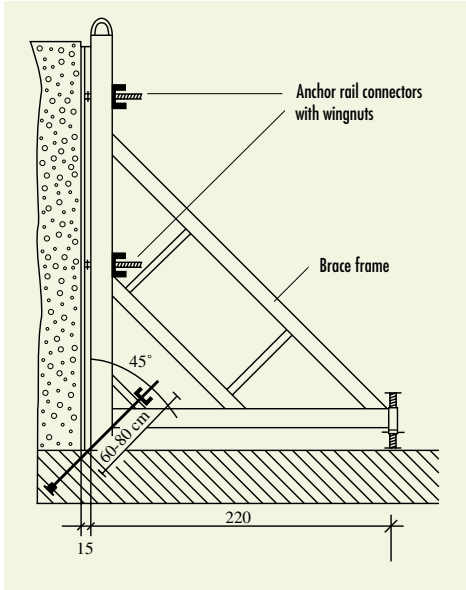
The suspending scaffold that are an integral part of the climbing platforms, can be accessed via the manhole cover on the main platform.

The suspending scaffold makes it possible to remove the suspension clevis



shoe and the anchoring cone that were used in the preceding step. (The service platform elements for repeated concrete pourings comply with (in terms of rules, calculations and specifications) and are regulated by the Italian National Research Council regulation no. 10027/85).

Different configurations



Supporting triangle
Anchoring – Triangle
as a reinforcing element

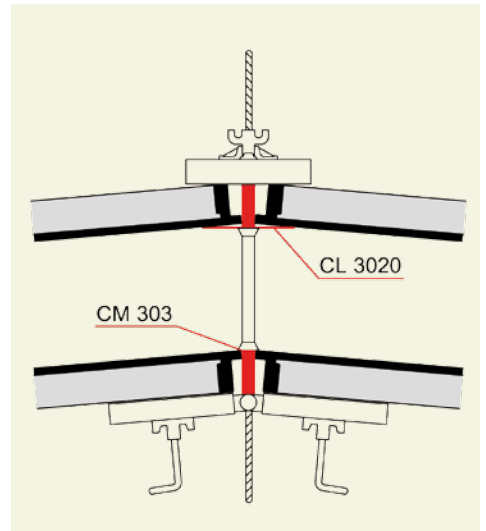


Sloping walls with an incline of more than 5°

- anchoring to compensate for the oscillating movement
- horizontal alignment of the connecting rods
- installation of a board between the frame and the wingnut in order to distribute the tension of the connecting rod equally on the formwork.



Variable angle



Circular Walls

Removal

The formwork panels are removed so that the subsequent operational steps can be carried out.

The individual modules must be removed in such a way that the security of the wall elements is not impaired and any tipping over is avoided.

For this purpose connecting rods and wingnuts are used that are inserted in one of the drill holes that have been made in the top in order to fix the panel securely to the wall that has already been poured.

Legal References

In so far as not expressly incorporated in the Installation, Use and Removal Instructions, the following operational

regulations and ministerial ordinances must be adhered to, in particular:

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- | | |
|--|--|
| • <i>Italian Legislative Decree 14/8/96 No. 494</i> | Implementation of Guidelines for Construction Sites 9257 CE |
| • <i>Italian Regulation 19/03/55 No. 164</i> | Prevention of Accidents on Construction Sites |
| • <i>Italian Ministerial Decree 28/11/987 No 592</i> | Implementation of Guidelines (84532 CEE) |
| • <i>Italian Presidential Decree 07/01/956 No.164</i> | Prevention of Accidents on Construction Sites |
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• We reserve the right to make technical changes. The photographs depicted in this handbook show construction site situations and are therefore not always exhaustive from a safety point of view.



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