



MULTIWALL  
PRODUCTS

# Technical Manual

Multiwall polycarbonate sheets

**Multiclear<sup>®</sup>**



# Multiclear®

MULTICLEAR® is a range of high quality extruded multiwall polycarbonate sheet(s). The MULTICLEAR® production facility has the latest extrusion technology purpose built to focus on high quality production and flexible service dedicated to the multiwall programme. The multiwall sheet has superior impact strength at quarter of the weight of glass of equivalent thickness.

MULTICLEAR® has more than four times the impact strength of PVC and more than ten times the impact strength of PMMA. The product has outstanding aesthetic quality replacing glass and other plastics in continuous glazing applications.

MULTICLEAR® features a uniform one side UV protection providing resistance against degradation caused by UV radiation from sunlight. There is a ten year limited warranty against discolouration, loss of impact strength and light transmission due to weathering. The double sided UV protection is available as of 8 mm which allows ease of handling, storage and installation as there is no need to label the sheet as required for one sided UV product.

The product is produced with uniform UV layer hence optimum protection against discolourations and reduction of mechanical properties. In case of fire, MULTICLEAR® sheet range will melt and allow venting where heat and smoke will be let out of the building and therefore reduce the growth of fire by flame spread.

MULTICLEAR® range has good thermal and sound insulation properties. The polycarbonate also offers good chemical resistance and can be used in extreme climates.

MULTICLEAR® STRONG range offers increased stiffness allowing cost saving by using less glazing bars for installations with increased light transmittance.

The opal colours are produced using diffusing additives offering a quality translucent product with uniform spread of light.

Arla Plast provide pre-installation/sealing guidelines, wind and snow loading calculations, sheet thickness application criteria, design and regulatory support Europe wide. The service offer will include computer automated knife cutting for cut-to-size sheets.

## APPLICATION AREAS

MULTICLEAR® is a suitable product for installations in various applications. For example:

### Building Industry

Roofing, cladding, sidewalls, conservatories, domes, skylights, sheds, car ports, smoke vents, swimming pool covers, suspended ceilings, glasshouses, sunrooms, shopping centre roofing, railway/metro station, stadia roofing and partitions.

### Lighting / Packaging

Lamp optics and Neon signs Boxes, pallet shields, protective covers for fragile items.

### Advertising

Illuminated signs and advertising panels

### Agriculture

Greenhouses, lorry/tractor ports and farm/barn buildings.

# Polycarbonate typical properties

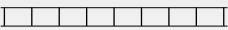
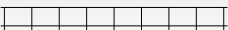
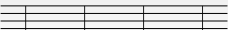

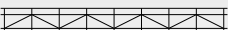
PROPERTY <sup>a)</sup>	VALUE/CLASS	UNIT	STANDARD
<b>Physical Properties</b>			
Density	1,2	g/cm <sup>3</sup>	ISO 1183
Refractive index	1,586		ISO 489
Moisture absorption 24 hours, 23°C, 50% RH	0,15	%	
<b>Mechanical Properties</b>			
Tensile strength at Yield (Break)	63 (70)	N/mm <sup>2</sup>	ISO 527
Tensile elongation at Yield (Break)	6 (110)	%	ISO 527
Elastic modulus	2300	N/mm <sup>2</sup>	ISO 527
Flexural modulus	2300	N/mm <sup>2</sup>	ISO 178
Charpy unnotched impact strenght + 23°C	NB (No Break)	kJ/m <sup>2</sup>	ISO 179/2D
Charpy unnotched impact strenght + 40°C	NB (No Break)	kJ/m <sup>2</sup>	ISO 179/2D
Izod notched impact strenght + 23°C	65	kJ/m <sup>2</sup>	ISO 180/1A
Izod notched impact strenght + 30°C	10	kJ/m <sup>2</sup>	ISO 180/1A
Rockwell hardness	M70		ISO 2039-2
<b>Thermal Properties</b>			
Linear coefficient of thermal expansion (23-80°C)	0,70	10 <sup>-4</sup> K <sup>-1</sup>	
Vicat temperature VST/B 120	149	°C	ISO 306
Vicat temperature VST/B 50	148	°C	ISO 306
Heat deflection temperature, HDT A (1,80 N/mm <sup>2</sup> )	132	°C	ISO 75
Heat deflection temperature, HDT B (0,45 N/mm <sup>2</sup> )	142	°C	ISO 75
Specific heat capacity, Cp	1,17	kJ/kg. K	
Thermal conductivity	0,21	W/m. K	DIN 52612

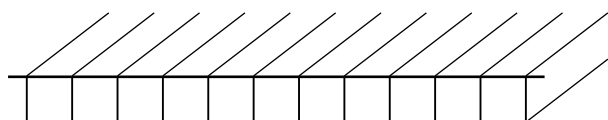
a) Properties reported here are typical polycarbonate values. Arla Plast makes no representation that the material in any particular shipment will conform exactly to the values given.

b) These ratings are not intended to reflect hazards presented by this or any other material under actual fire conditions.

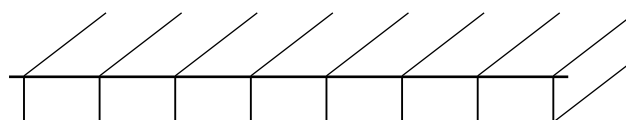
The information above is based upon practical experiences and given in good faith. Due to many factors, affecting the use of our products, which are outside our knowledge and control, no warranty is given nor is to be implied with respect to such information. 01/09/2007

## Multiclear Product Range

PRODUCT	THICKNESS mm	STEP mm	WEIGHT g/m <sup>2</sup>	U-VALUE W/mK	Width (mm)				UV SIDE	Standard Colour	
					2100	1250	1200	980		Opal	Bronze
<b>MULTICLEAR® BOX 2 Wall</b> 	4	6	800	3,9	✓					✓	✓
	6	6	1300	3,5	✓					✓	✓
	6	10	1300	3,5	✓					✓	✓
	8	10	1500	3,2	✓	✓	✓	✓		✓	✓
	10	10	1700	3,0	✓	✓	✓	✓		✓	✓
<b>MULTICLEAR® BOX 3 Wall</b> 	16	20	2700	2,3		✓	✓	✓	1(2)	✓	✓
<b>MULTICLEAR® BOX 7 Wall</b> 	16	16	2700	1,8	✓	✓	✓	✓	1(2)	✓	✓
	20	16	3000	1,6	✓	✓	✓	✓	1(2)	✓	✓
<b>MULTICLEAR® STRONG</b> 	10	10	1700	2,5	✓	✓	✓	✓	1(2)	✓	✓
	16	10	2700	2,0	✓	✓	✓	✓	1(2)	✓	✓
	20	10	3000	1,8	✓	✓	✓	✓	1(2)	✓	✓
	25	10	3400	1,6	✓	✓	✓	✓	1(2)	✓	✓
<b>MULTICLEAR® LIGHT</b> 	16	16	2700	1,8		✓	✓	✓	1(2)	✓	✓
	20	16	3000	1,6		✓	✓	✓	1(2)	✓	✓
	25	20	3400	1,5	✓	✓	✓	✓	1(2)	✓	✓
	32	20	3600	1,3	✓	✓	✓	✓	1(2)	✓	✓
	35	20	3800	1,2	✓	✓	✓	✓	1(2)	✓	✓
	40	20	4000	1,1	✓	✓	✓	✓	1(2)	✓	✓



MULTICLEAR® BOX 2 Wall  
6 mm step

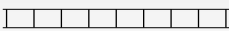



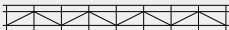


MULTICLEAR® BOX 2 Wall  
10 mm step

## Light Transmission

MULTICLEAR® sheet has excellent light transmission, allowing to take advantage of natural light conditions in buildings. The opalescent and bronze colours are designed to control the natural light transmission in order to reduce the heating of the building interior in warm climates or sunny days. The opalescent sheet has a special light diffusion additive that spreads the light and guarantees optimal light conditions in any corner of the building without any shadows.

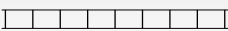
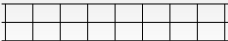



The control of the solar energy is an important requirement in modern buildings. Specific products and colours reduce considerably the solar heating and improve the interior comfort.

Type	Thickness mm	Weight g/m <sup>2</sup>	Light Transmission (%)		
			Clear	Opal	Bronze
<b>MULTICLEAR® BOX 2 Wall</b> 	4	800	84	70	60
	6	1300	82	60	50
	8	1500	83	66	50
	10	1700	82	64	49
<b>MULTICLEAR® BOX 3 Wall</b> 	16	2700	74	48	25
<b>MULTICLEAR® BOX 7 Wall</b> 	16	2700	64	45	
	20	3000	62	45	
<b>MULTICLEAR® STRONG</b> 	10	1700	64	55	35
	16	2700	64	45	25
	20	3000	64	46	23
	25	3400	63	44	20
<b>MULTICLEAR® LIGHT</b> 	16	2700	63	45	
	20	3000	58	45	
	25	3400	53	38	23
	32	3600	53	34	20
	35	3800	45	15	20
	40	4000	52	32	18

# Thermal Insulation

Thermal insulation is a major requirement for energy saving in buildings. MULTICLEAR® sheet offers significant advantages compared to mono layered glazing materials. The hollow structure reduces significantly the heat losses in roofing or glazing applications.





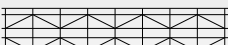
The thermal insulation or U value (formerly k-value) is expressed in Watt per square metre and per Kelvin. The U-value describes how well building materials conduct heat, as it gives the rate of heat transfer through a material of known thickness over a given area.

Type	Thickness mm	Weight g/m <sup>2</sup>	Thermal Insulation W/m <sup>2</sup> K
<b>MULTICLEAR® BOX 2 Wall</b> 	4	800	3,9
	6	1300	3,5
	8	1500	3,2
	10	1700	3,0
<b>MULTICLEAR® BOX 3 Wall</b> 	16	2700	2,3
<b>MULTICLEAR® BOX 7 Wall</b> 	16	2700	1,8
	20	3000	1,6
<b>MULTICLEAR® STRONG</b> 	10	1700	2,5
	16	2700	2,0
	20	3000	1,8
	25	3400	1,6
<b>MULTICLEAR® LIGHT</b> 	16	2700	1,8
	20	3000	1,6
	25	3400	1,5
	32	3600	1,3
	35	3800	1,2
	40	4000	1,1

## Sound Insulation

The hollow structure of the MULTICLEAR® sheet offers advantages compared to mono layered glazing materials in respect of sound reduction.

The sound reduction values, expressed in dB, are for frequencies between 100 and 3150 Hz and are estimated according to the ISO 717-1 standard.

Type	Thickness mm	Weight g/m <sup>2</sup>	Sound Insulation dB
<b>MULTICLEAR® BOX 2 Wall</b> 	4	800	
	6	1300	
	8	1500	18
	10	1700	18
<b>MULTICLEAR® BOX 3 Wall</b> 	16	2700	
<b>MULTICLEAR® BOX 7 Wall</b> 	16	2700	18
	20	3000	18
<b>MULTICLEAR® STRONG</b> 	10	1700	18
	16	2700	19
	20	3000	19
	25	3400	19
<b>MULTICLEAR® LIGHT</b> 	16	2700	19
	20	3000	19
	25	3400	19
	32	3600	19
	35	3800	19
	40	4000	19

## Impact Strength

MULTICLEAR® sheet is extruded from polycarbonate resin and offers an extremely high impact resistance compared to traditional transparent glazing materials like glass and acrylic sheet.

Furthermore the impact strength remains unchanged for a very wide temperature range. Indeed MULTICLEAR® sheet will keep high impact values from -40°C to +120°C.

Compared to glass and PMMA sheet, polycarbonate is very ductile and does not break sharply, but instead deforms gradually under impact and absorbs the impact energy.

Following table gives a comparison in falling dart impact strength, expressed in absorbed energy, between various glazing materials.

A major requirement for a roofing material is the hail resistance. MULTICLEAR® sheet has about the best hail resistance of all light transmitting roofing materials. It has been tested according to simulated hail impact tests, whereby the sheet is impacted with PA hailstones with a diameter of 5 to 40 mm at a speed up to 21 m/s without any significant damage.

The hail resistance is very dependent on the UV protection of the sheet (in internal applications, there is no hail risk).

MULTICLEAR® sheet has an excellent UV protection given by a co-extruded layer with an option of one or both sides protection of the sheet.

The hail resistance is part of the 10 year warranty certificate provided for MULTICLEAR® sheet.

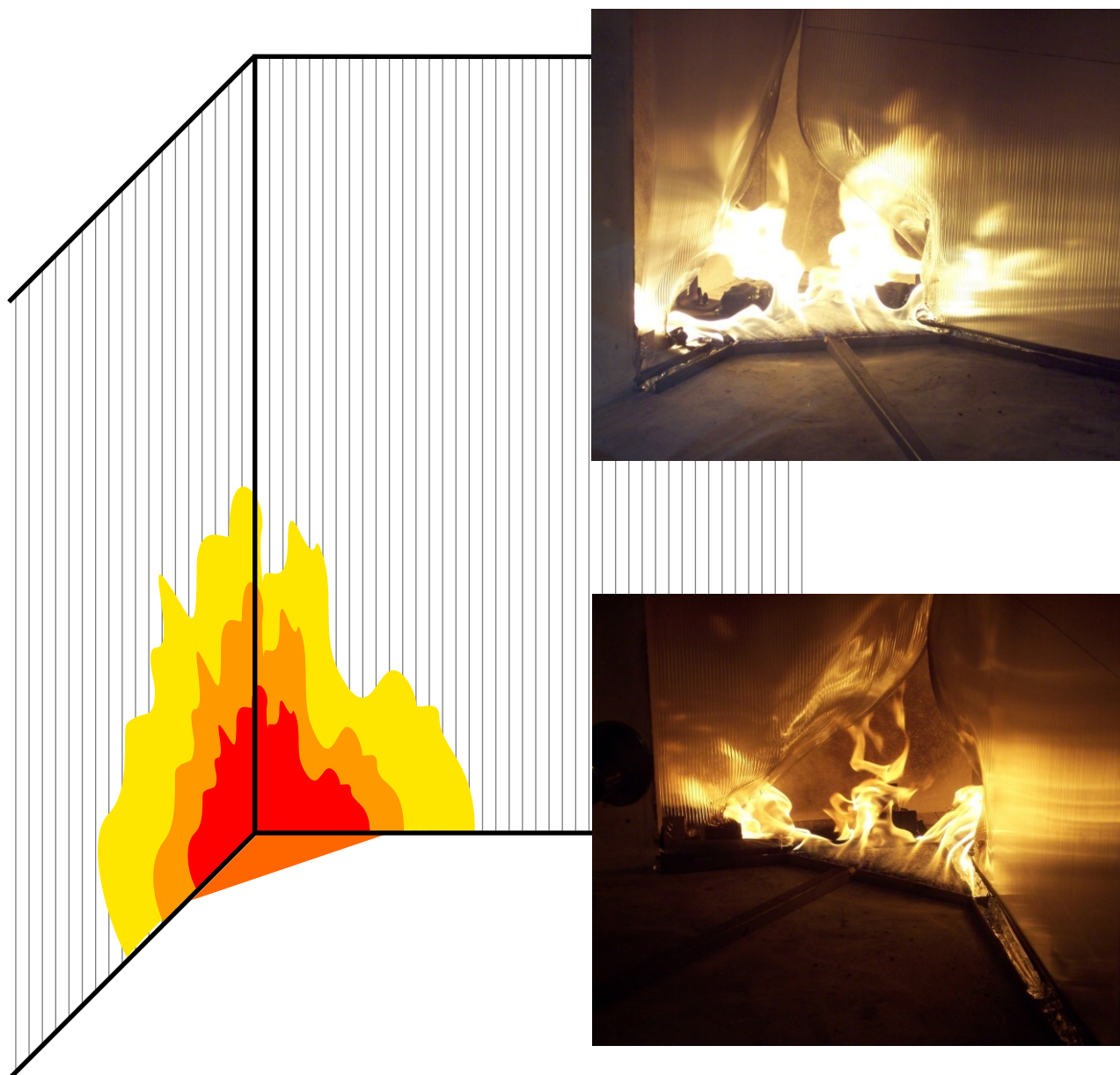
Material	Joule
Glass 4 mm	2
Tempered glass 6 mm	10
Acrylic sheet 4 mm	12
MULTICLEAR® BOX 2W 10 mm	160
Solid polycarbonate sheet 2 mm	200

## Fire Performance

MULTICLEAR® sheet is extruded from polycarbonate resin.

Polycarbonate is one of the best thermoplastics with regards to fire performance.. Fire performance is measured in different countries according to local fire regulatory tests. These tests are being replaced in Europe by a pan European test, called the SBI test (single burning item).

Regulatory fire certificates according to specific tests are available from Arla Plast on request.



## UV Performance

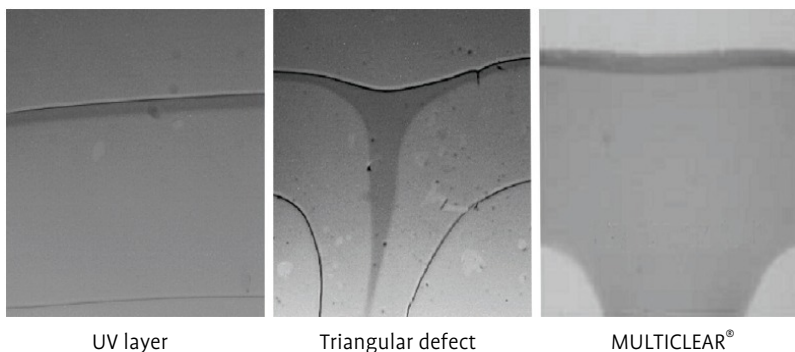
MULTICLEAR® sheet is protected by a co-extruded layer against the deteriorating effect of the UV fraction of the sunlight. Ultraviolet sunrays are responsible for early ageing effects on building materials with results yellowing, loss in light transmission and impact strength. MULTICLEAR® sheet is co-extruded during production with a UV protection layer.

This layer filters out the UV light and is continuously being checked during production. Therefore MULTICLEAR® sheet is covered by a 10 year warranty against ageing by outside weathering. This 10 year limited warranty against loss of light transmission, excessive yellowing and breakage of the sheet by hail impact is available on demand.

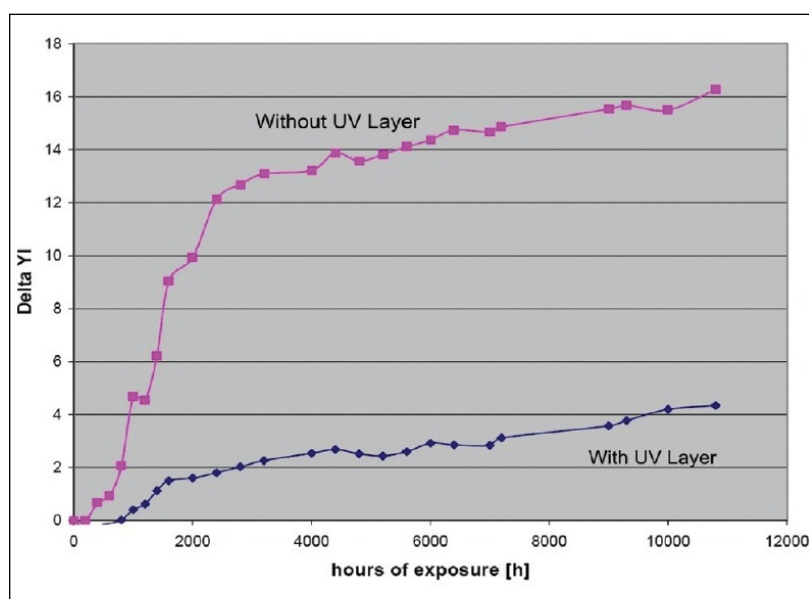
MULTICLEAR® sheet is being produced on very modern equipment that allows consistent even and equal protection layers. Against competitive sheets, the production equipment allows to avoid a common “triangular” defect in the UV layer at the location of the ribs.

UV resistance is commonly measured by artificial laboratory tests to simulate outside weathering. The 10 mm MULTICLEAR® BOX sheet has been tested according to the WOM test and ASTM D-2565 standard.

In this WOM test a result after 7500 hours is considered to be equivalent to 10 years in central European climate conditions.



Compared to common sheet, MULTICLEAR® sheet can be protected on both sides against ageing by UV light. This protection avoids a common mistake during installation of the sheet when the unprotected side is installed towards the outside.



# Chemical Resistance

Polycarbonate is a very ductile material. However in contact with certain chemicals, the material can lose its high impact properties and even become brittle and show hazing. It is important that before installation of MULTICLEAR® sheet, the possible contact with chemical agents is avoided and checked. Also when cleaning or treating the sheet with chemical products, care should be taken not to use products that can damage the sheet. The amount of damage is a combination of the concentration of the chemical agent, exposure time and the temperature.

A list of common chemical agents and their effect on MULTICLEAR® sheet is available on request. A short list is included below for guidelines. The chemical resistance needs not only be considered when cleaning the sheet, but also when using seals and any other fixing elements. In particular PVC products that contain plasticizers are detrimental to polycarbonate.

The 10 year limited warranty provided for MULTICLEAR® sheet does not cover any misuse of the sheet in respect of contact with chemical agents.

In specific cases, testing can be carried out to evaluate the compatibility of certain products in contact applications with polycarbonate.

Chemical	Rating
Acids, dilute	Good
Acids, concentrated	Fair-Good
Alkalis	Poor-Fair
Organic solvents:	
Alcohols	Good
Chlorinated hydrocarbons	Poor
Aromatic hydrocarbons	Poor
Aliphatic hydrocarbons	Good
Cooking oils	Good
Lubricating oils	Good
Photochemicals	Good
Detergents	Good



# Loading Curves

SPECIAL CALCULATIONS AND REPORT PROVIDED ON REQUEST

## CALIBRATOR

Load characteristics of structural sheet.

**Input**

**Sheet:** Multiclear - Strong 20mm

Thickness: 20 [mm]  
Specific Weight: 3 [kg/m<sup>2</sup>]

**Customer conditions:**

Maximum Displacement: 30 [mm]  
Maximum Displ./span: 0,2  
Maximum pop-out: 15 [mm]

**Frame:** 2 sides supported along L

Safety factor: 1

Actual Pressure Load: 1 [kN/m<sup>2</sup>]  
Actual Suction Load: 1 [kN/m<sup>2</sup>]  
Allowed Panel Width: 895,2 [mm]

**Pressure results [kN/m<sup>2</sup>]**

**Suction results [kN/m<sup>2</sup>]**

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Specific information about the sheet

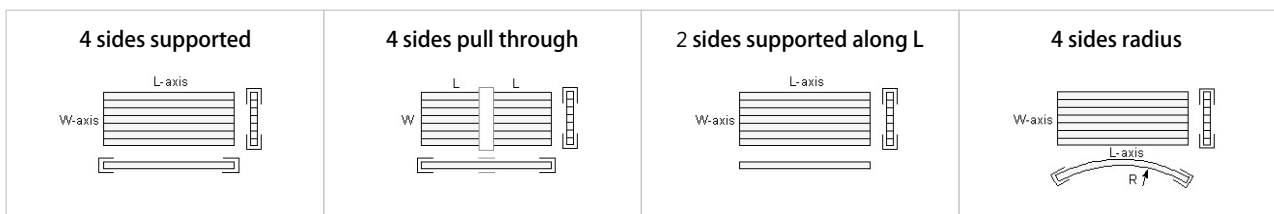
Maximum Displacement and pop out are info given by customer

Possibility to have different kind of support. See attachment below

Safety factor is info given by customer

Parameters for x and y-values of blue lines

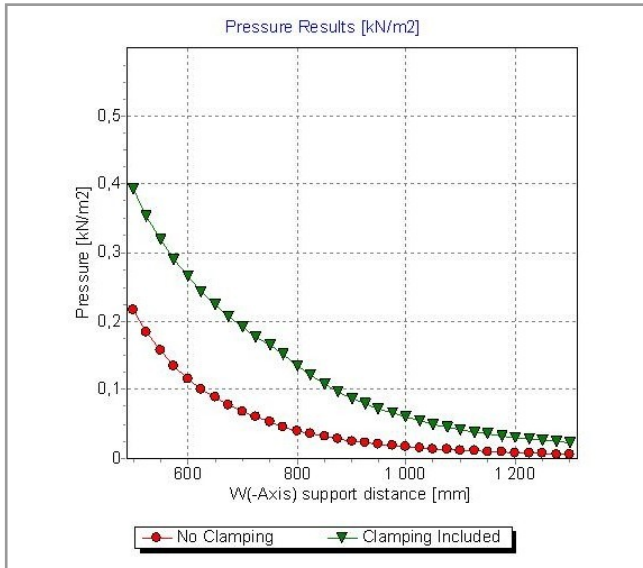
## CUSTOMER REQUEST FOR SUPPORTING OF THE SHEETS



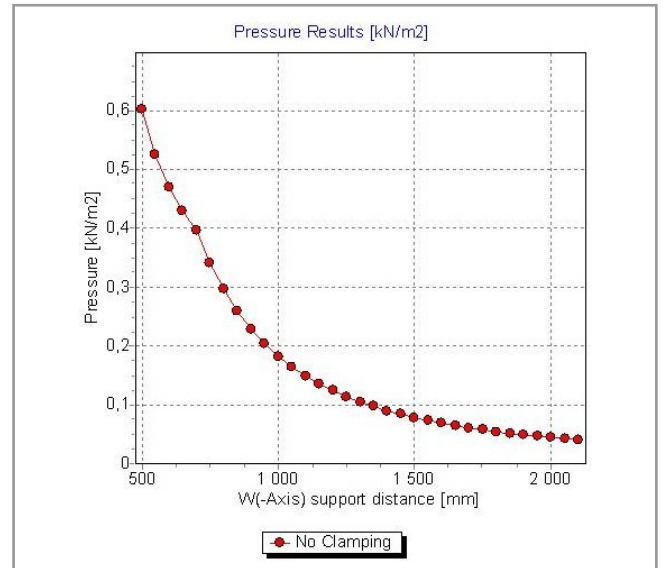
# Loading Curves

## MULTICLEAR® BOX 2W 4 mm

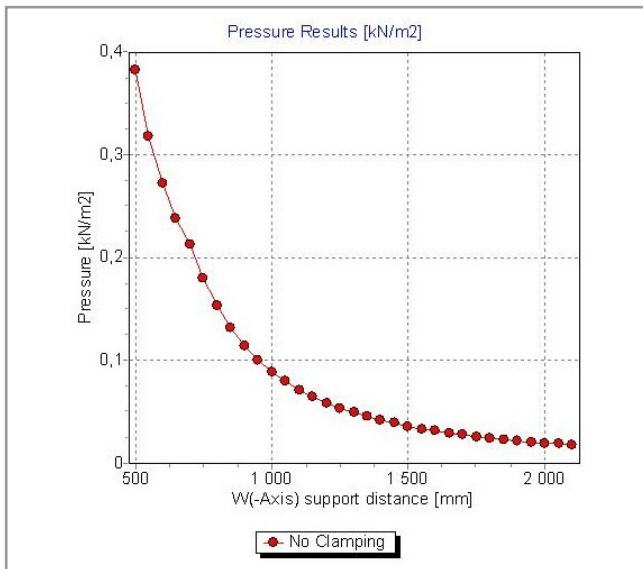
2 sides supported parallel to the length



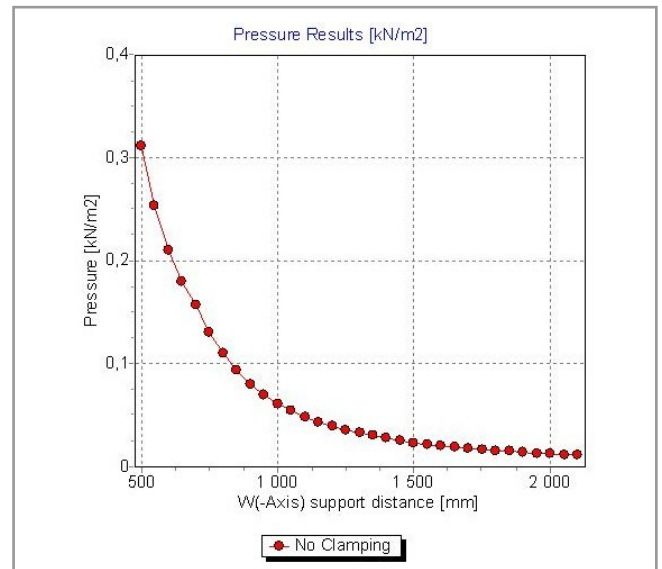
4 sides supported for the frame length 2100 mm



4 sides supported for the frame length 3150 mm



4 sides supported for the frame length 4000 mm



### Legend

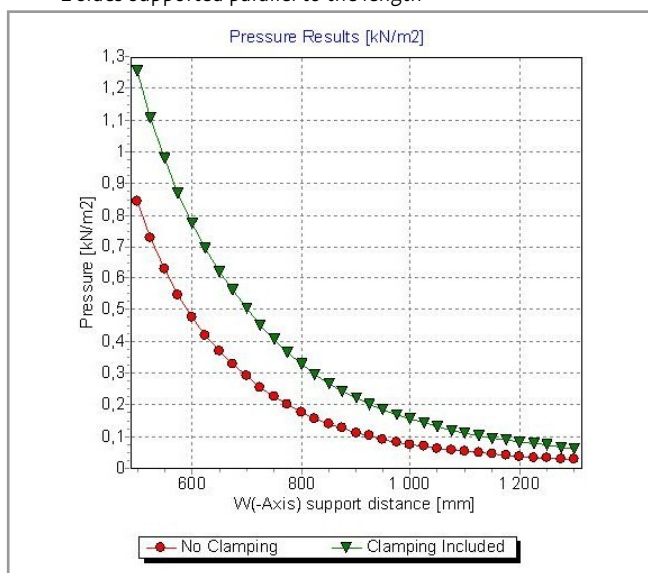
Maximum displacement	65 mm
Span	0,2
Maximum pop-out	15 mm
Safety factor	1
Panel width 2 sides supported	1300 mm
Panel width 4 sides supported	2100 mm

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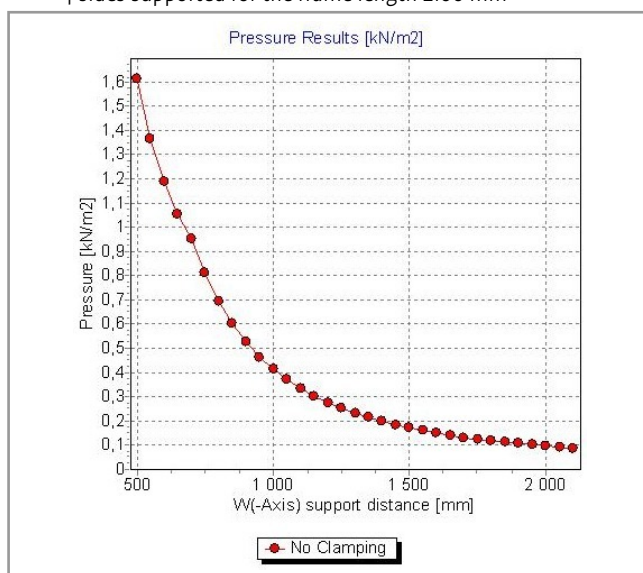
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## MULTICLEAR® BOX 2W 6 mm

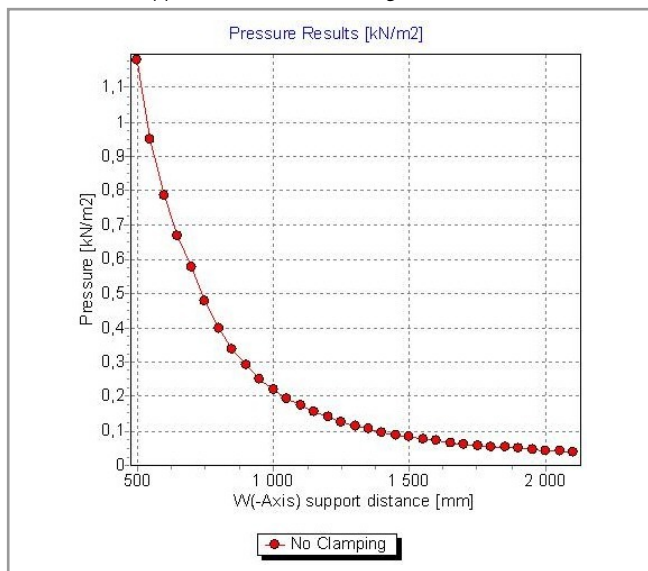
2 sides supported parallel to the length



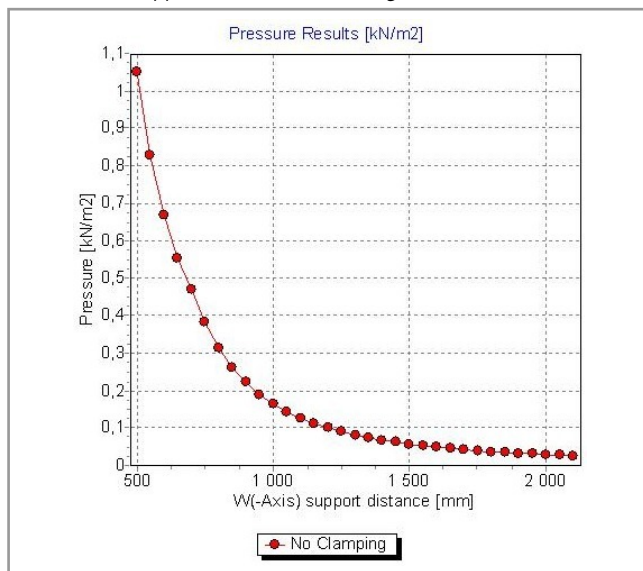
4 sides supported for the frame length 2100 mm



4 sides supported for the frame length 3150 mm



4 sides supported for the frame length 4000 mm



Legend

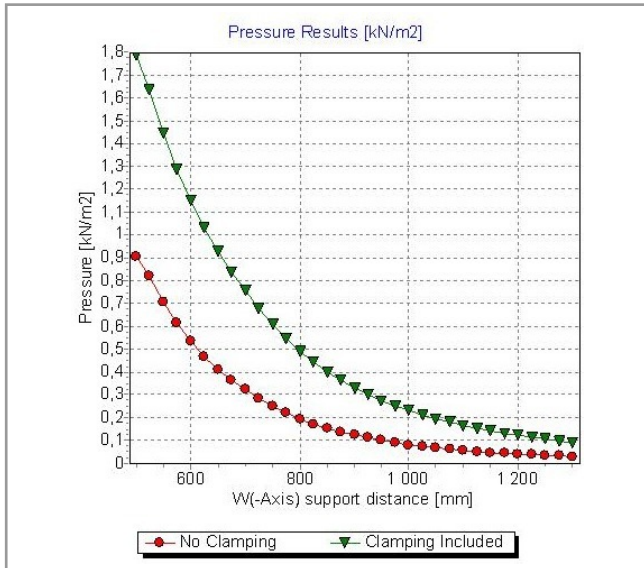
Maximum displacement	65 mm
Span	0,2
Maximum pop-out	15 mm
Safety factor	1
Panel width 2 sides supported	1300 mm
Panel width 4 sides supported	2100 mm

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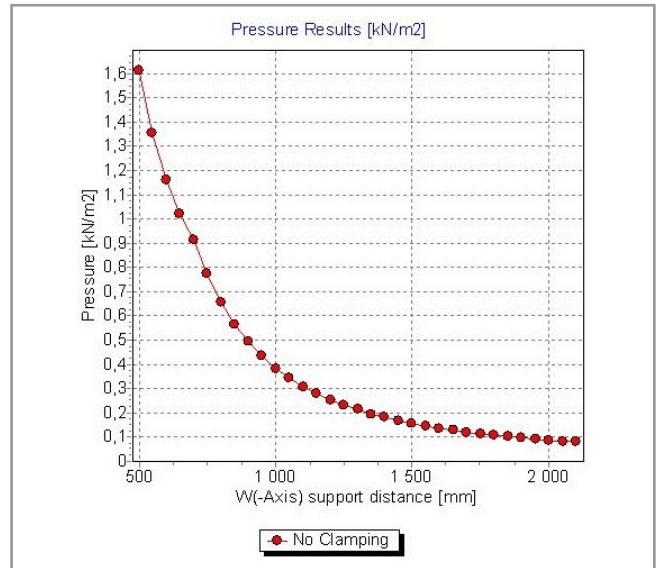
# Loading Curves

## MULTICLEAR® BOX 2W 6 mm, step 10 mm

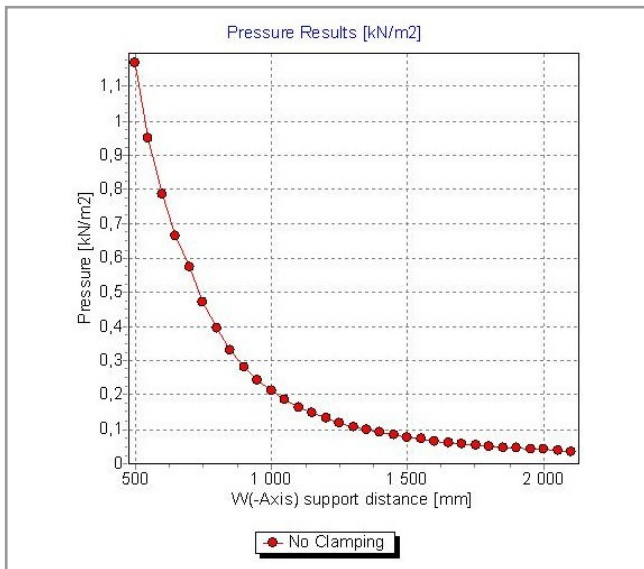
2 sides supported parallel to the length



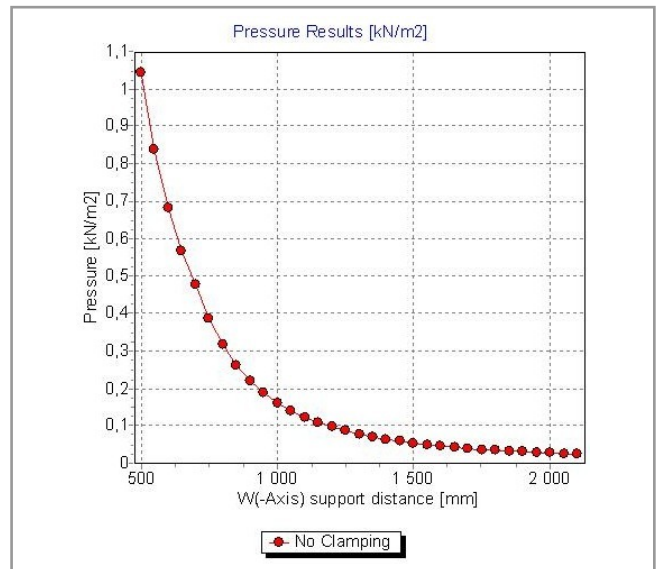
4 sides supported for the frame length 2100 mm



4 sides supported for the frame length 3150 mm



4 sides supported for the frame length 4000 mm



### Legend

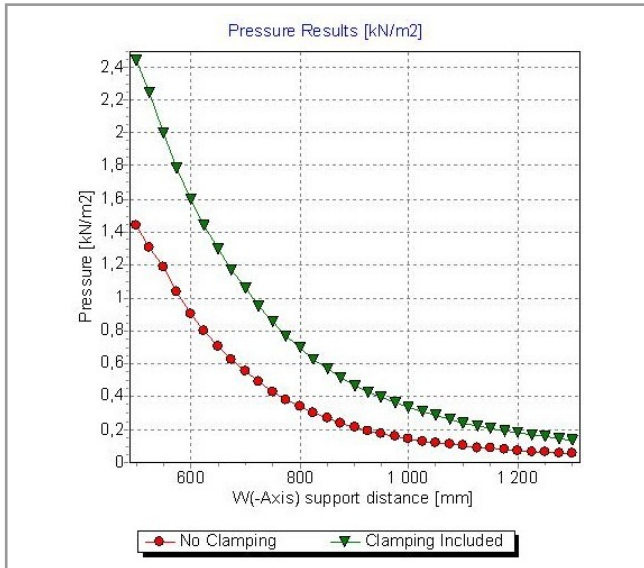
Maximum displacement	65 mm
Span	0,2
Maximum pop-out	15 mm
Safety factor	1
Panel width 2 sides supported	1300 mm
Panel width 4 sides supported	2100 mm

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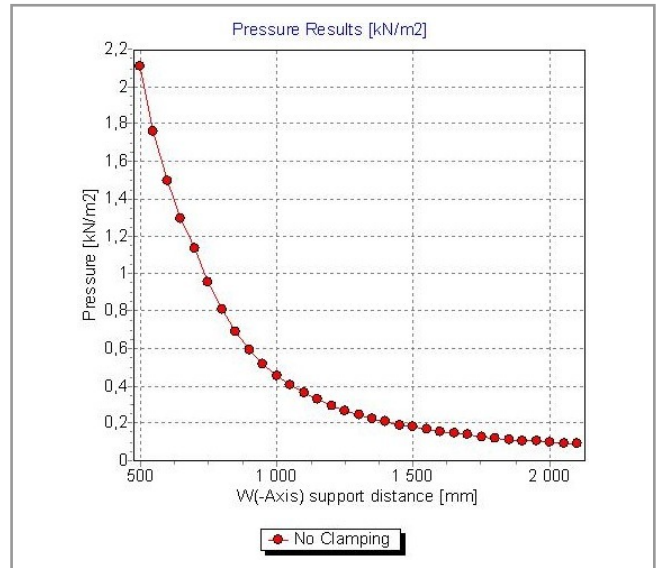
# Loading Curves

## MULTICLEAR® BOX 2W 8 mm

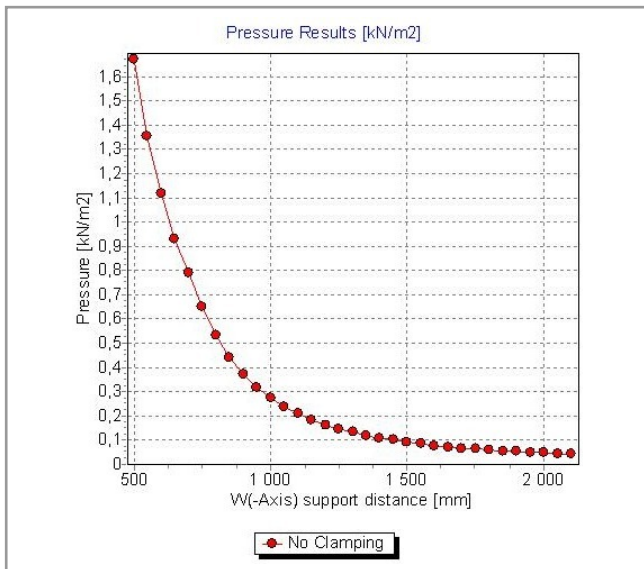
2 sides supported parallel to the length



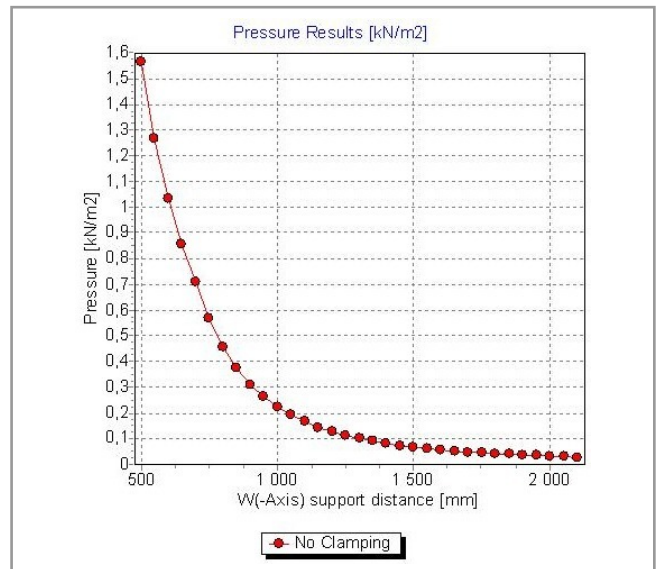
4 sides supported for the frame length 2100 mm



4 sides supported for the frame length 3150 mm



4 sides supported for the frame length 4000 mm



### Legend

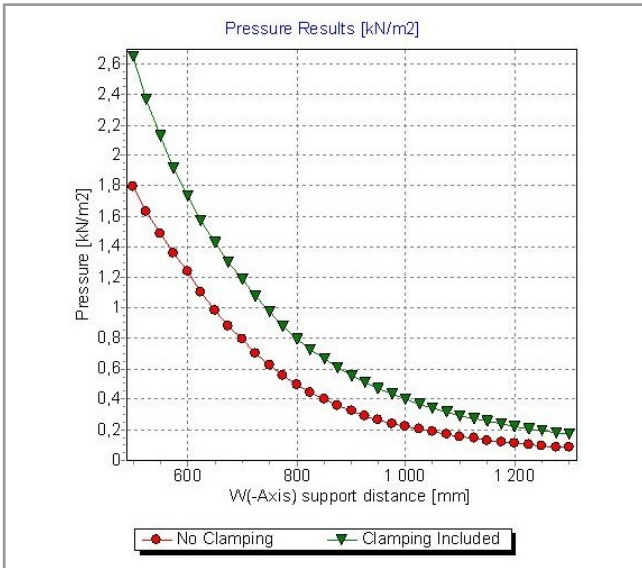
Maximum displacement	65 mm
Span	0,2
Maximum pop-out	15 mm
Safety factor	1
Panel width 2 sides supported	1300 mm
Panel width 4 sides supported	2100 mm

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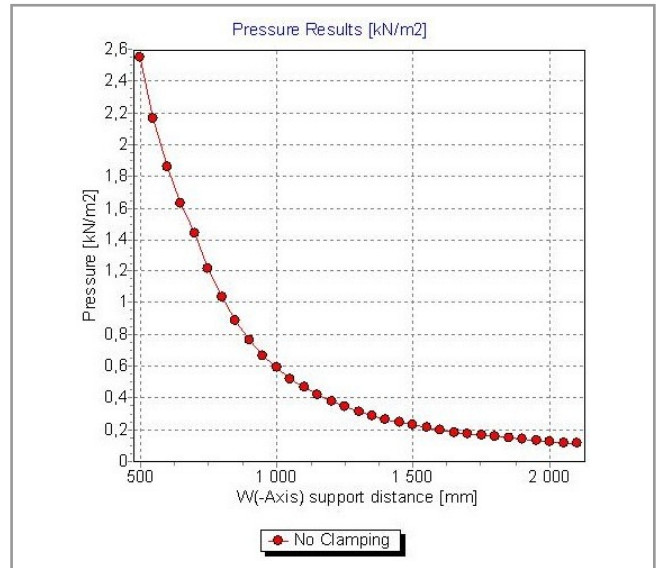
# Loading Curves

## MULTICLEAR® BOX 2W 10 mm

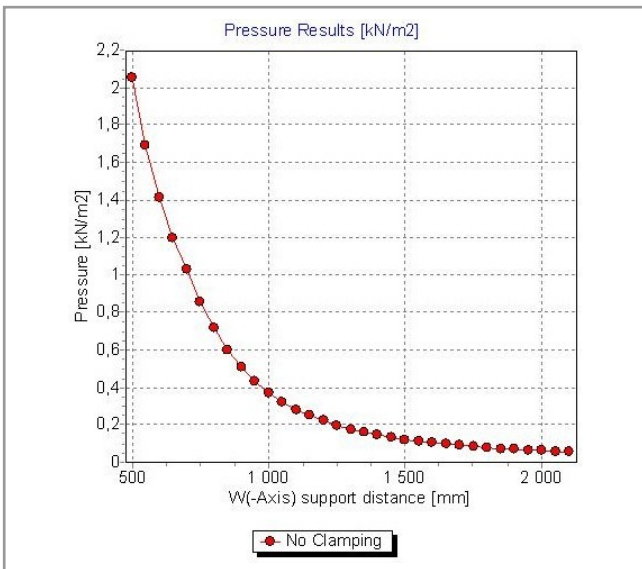
2 sides supported parallel to the length



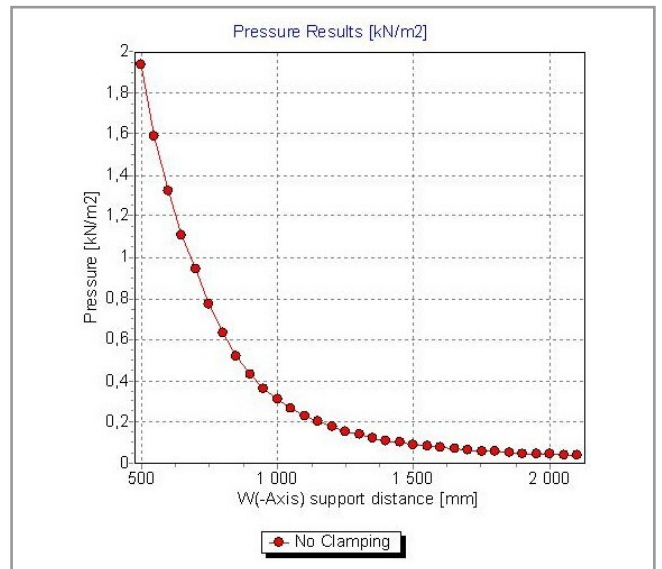
4 sides supported for the frame length 2100 mm



4 sides supported for the frame length 3150 mm



4 sides supported for the frame length 4000 mm



### Legend

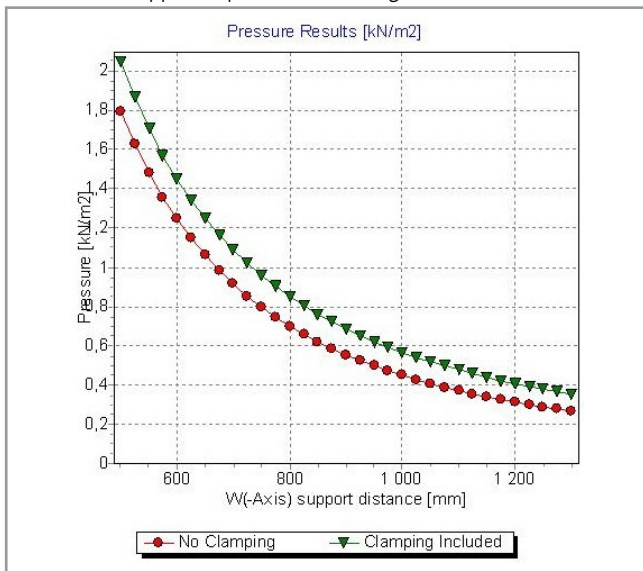
Maximum displacement	65 mm
Span	0,2
Maximum pop-out	15 mm
Safety factor	1
Panel width 2 sides supported	1300 mm
Panel width 4 sides supported	2100 mm

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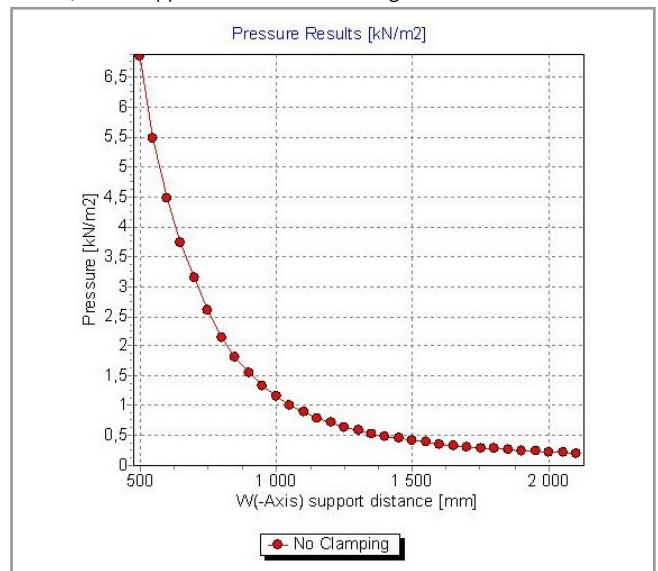
# Loading Curves

## MULTICLEAR® BOX 3W 16 mm

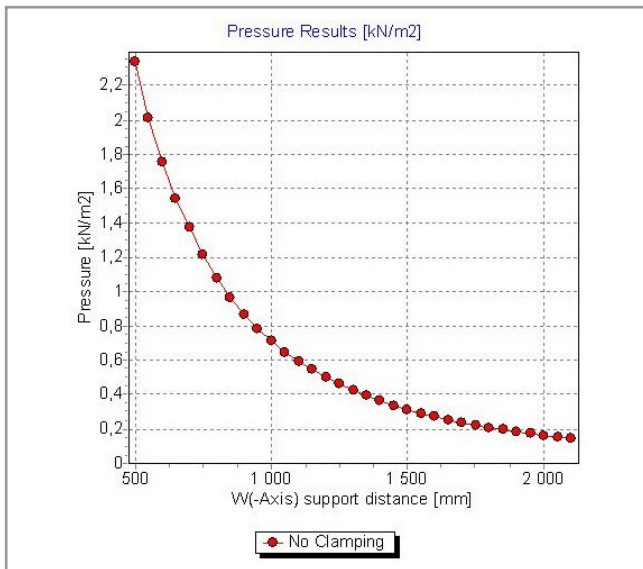
2 sides supported parallel to the length



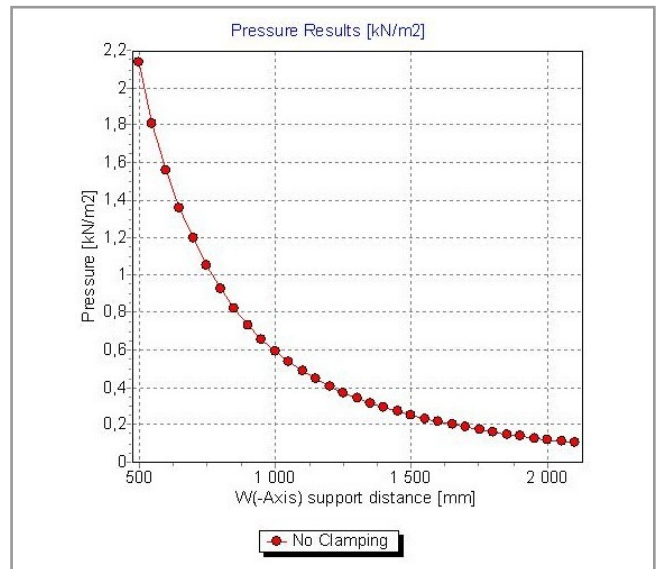
4 sides supported for the frame length 2100 mm



4 sides supported for the frame length 3150 mm



4 sides supported for the frame length 4000 mm



### Legend

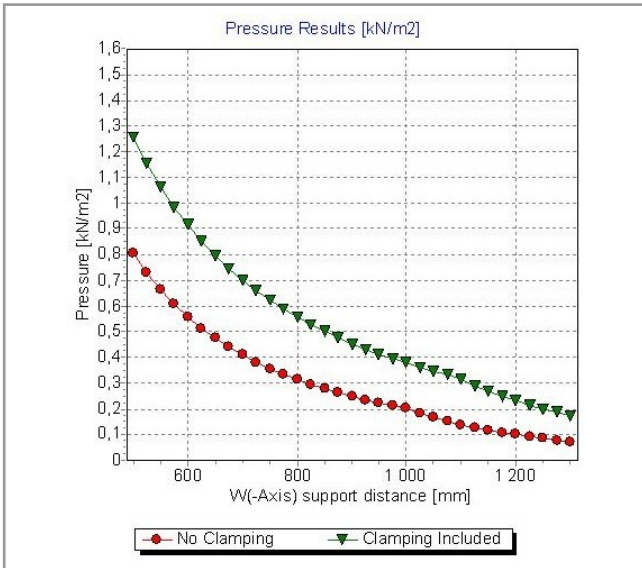
Maximum displacement	65 mm
Span	0,2
Maximum pop-out	15 mm
Safety factor	1
Panel width 2 sides supported	1300 mm
Panel width 4 sides supported	2100 mm

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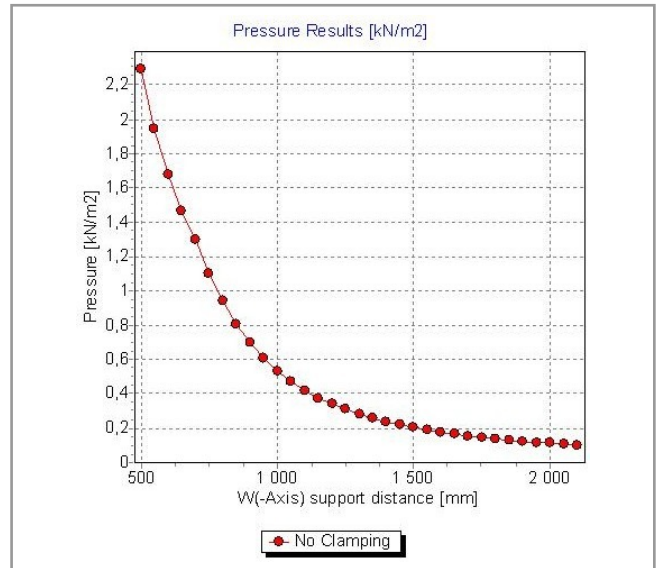
# Loading Curves

## MULTICLEAR® STRONG 10 mm

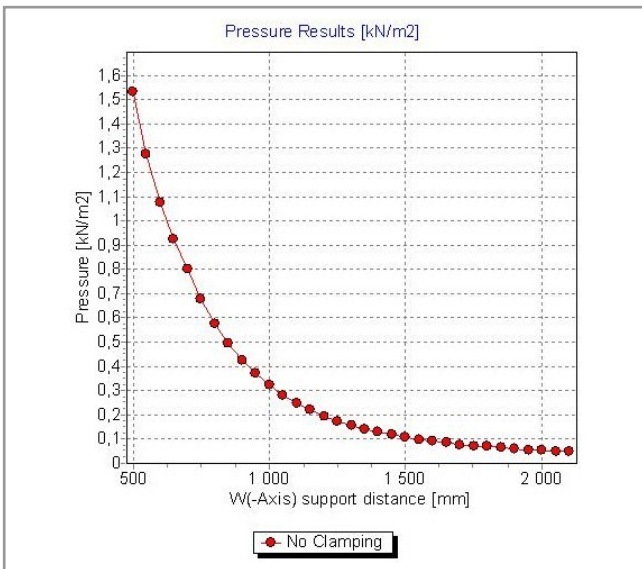
2 sides supported parallel to the length



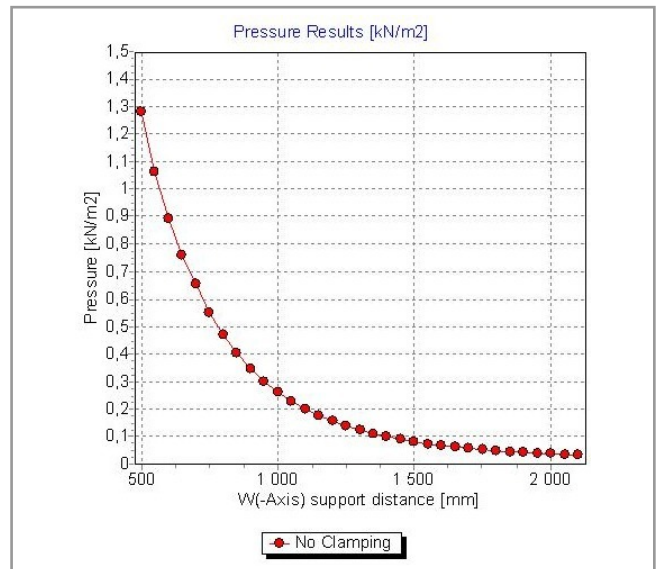
4 sides supported for the frame length 2100 mm



4 sides supported for the frame length 3150 mm



4 sides supported for the frame length 4000 mm



Legend

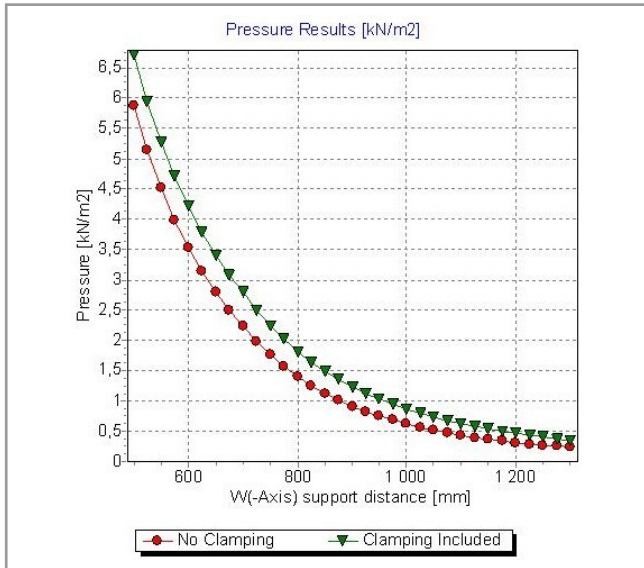
Maximum displacement	65 mm
Span	0,2
Maximum pop-out	15 mm
Safety factor	1
Panel width 2 sides supported	1300 mm
Panel width 4 sides supported	2100 mm

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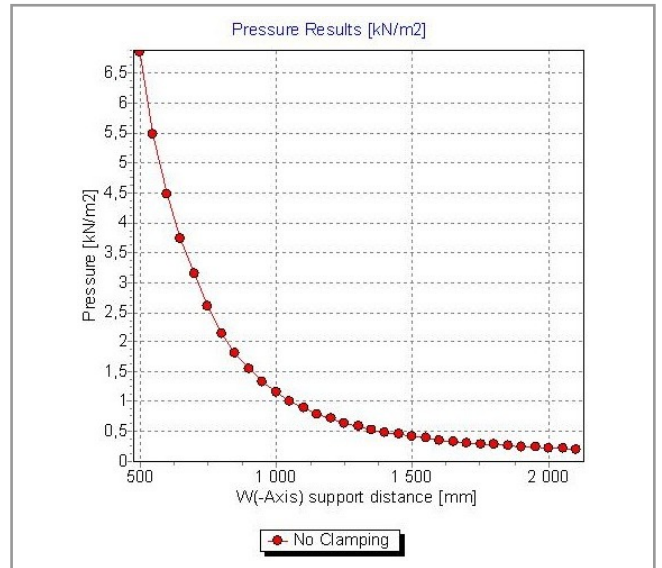
# Loading Curves

## MULTICLEAR® STRONG 16 mm

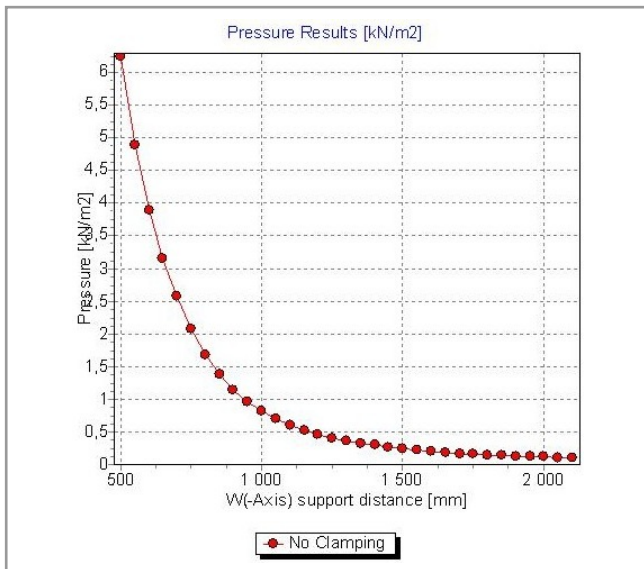
2 sides supported parallel to the length



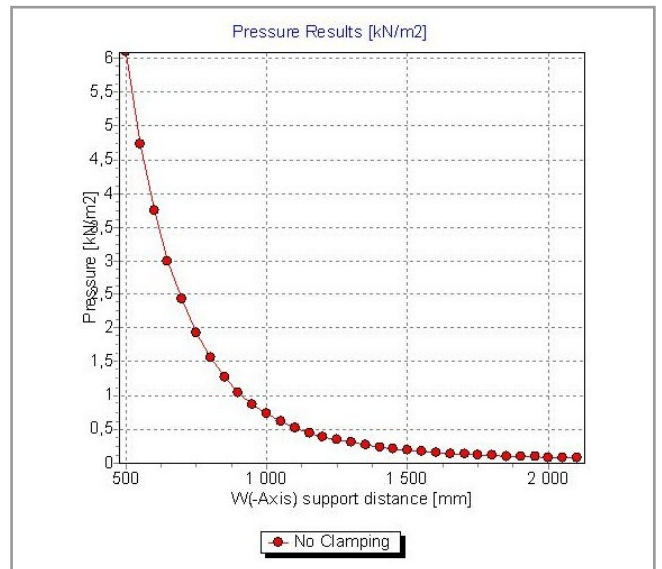
4 sides supported for the frame length 2100 mm



4 sides supported for the frame length 3150 mm



4 sides supported for the frame length 4000 mm



### Legend

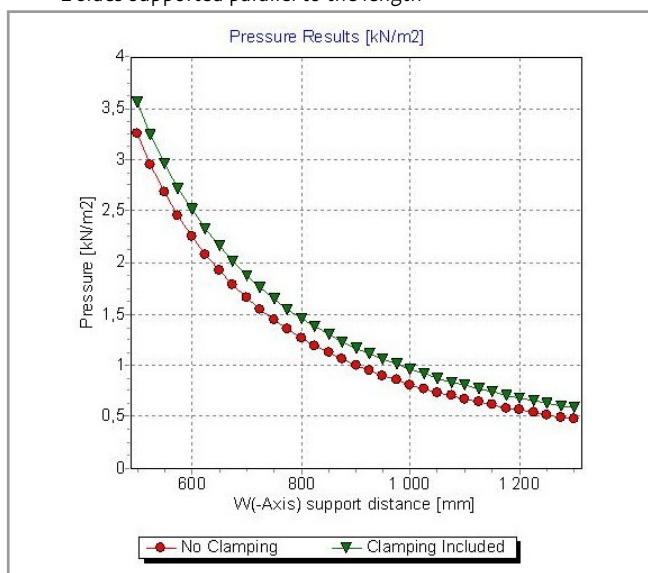
Maximum displacement	65 mm
Span	0,2
Maximum pop-out	15 mm
Safety factor	1
Panel width 2 sides supported	1300 mm
Panel width 4 sides supported	2100 mm

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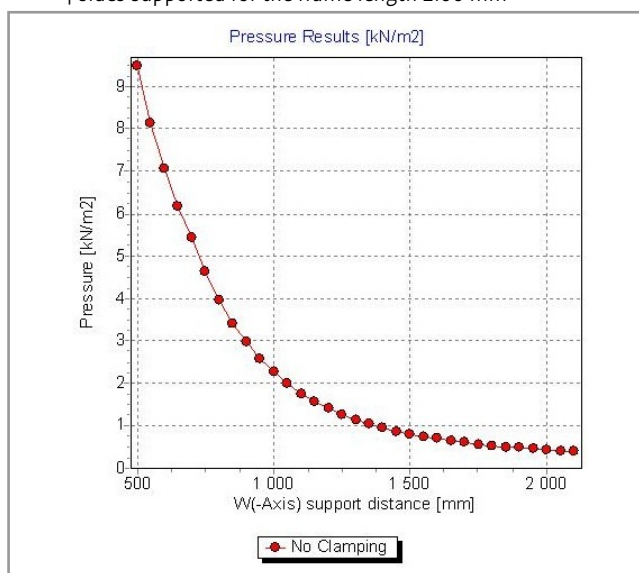
# Loading Curves

## MULTICLEAR® STRONG 20 mm

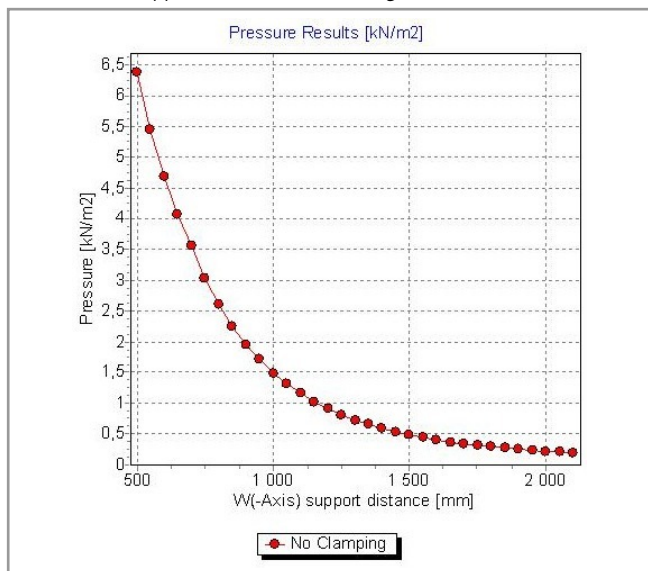
2 sides supported parallel to the length



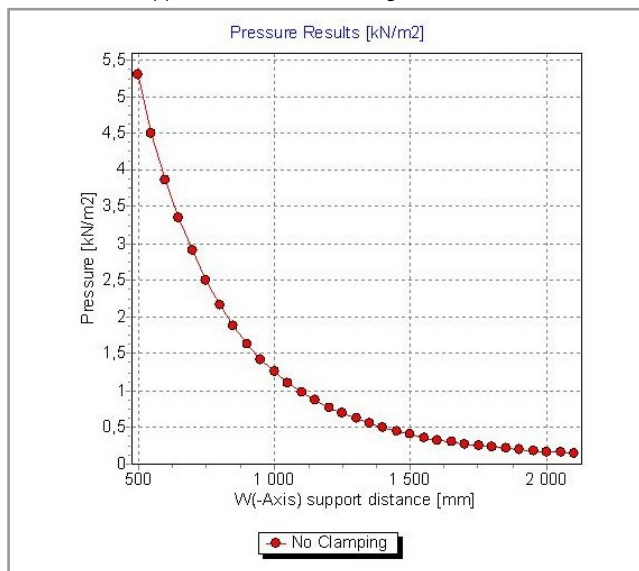
4 sides supported for the frame length 2100 mm



4 sides supported for the frame length 3150 mm



4 sides supported for the frame length 4000 mm



### Legend

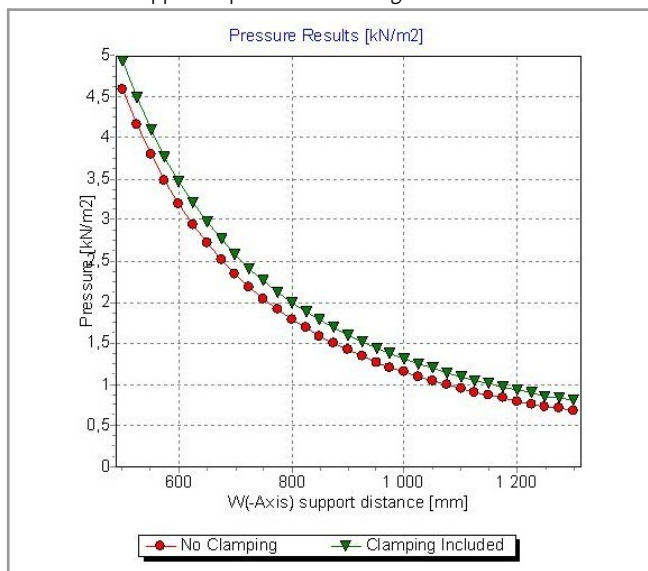
Maximum displacement	65 mm
Span	0,2
Maximum pop-out	15 mm
Safety factor	1
Panel width 2 sides supported	1300 mm
Panel width 4 sides supported	2100 mm

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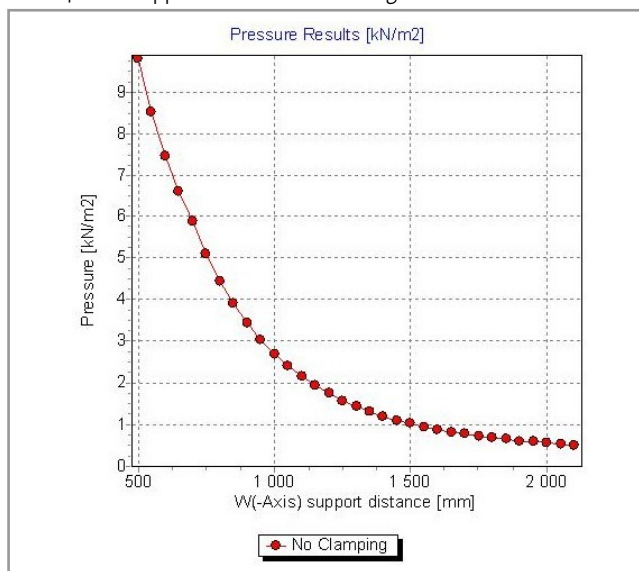
# Loading Curves

## MULTICLEAR® STRONG 25 mm

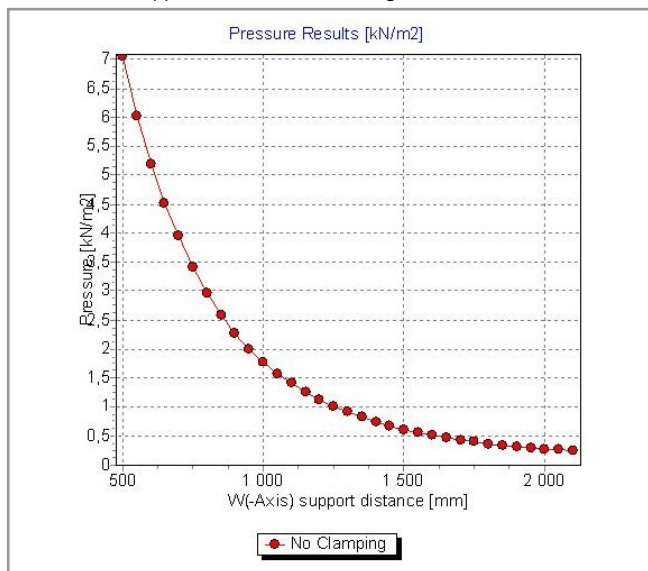
2 sides supported parallel to the length



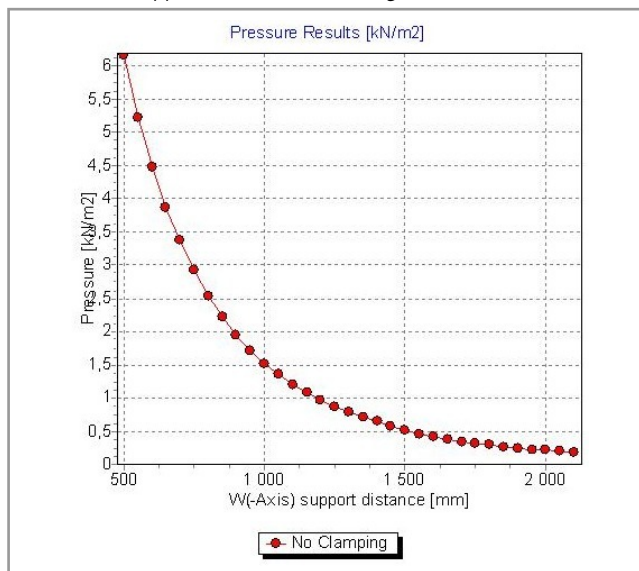
4 sides supported for the frame length 2100 mm



4 sides supported for the frame length 3150 mm



4 sides supported for the frame length 4000 mm



Legend

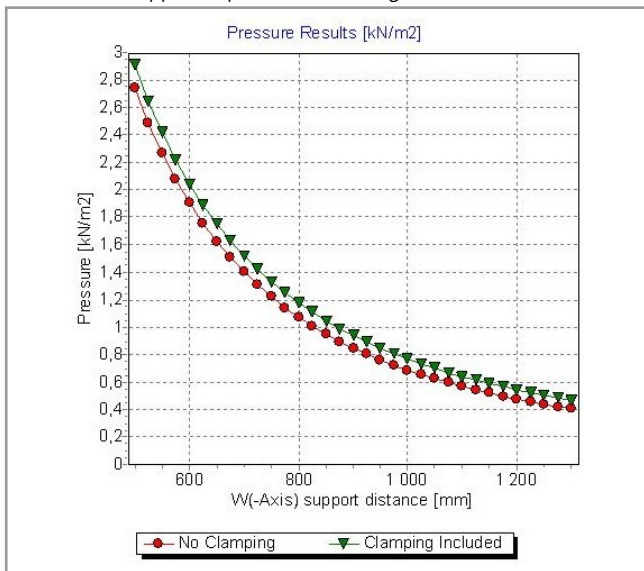
Maximum displacement	65 mm
Span	0,2
Maximum pop-out	15 mm
Safety factor	1
Panel width 2 sides supported	1300 mm
Panel width 4 sides supported	2100 mm

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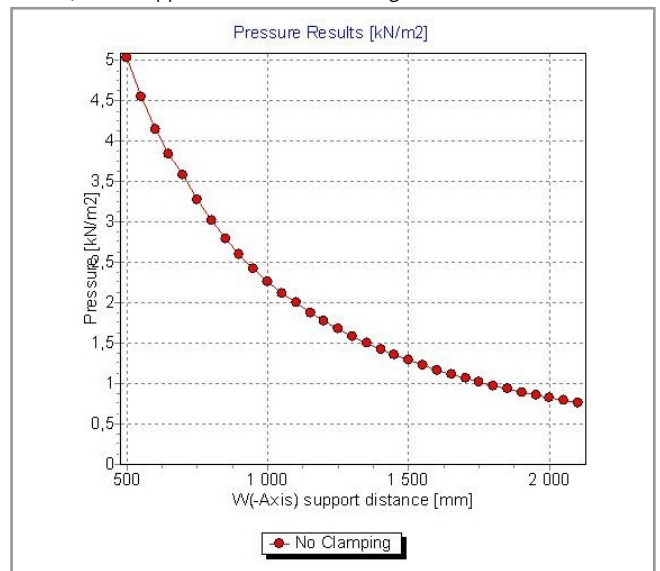
# Loading Curves

## MULTICLEAR® LIGHT 32 mm

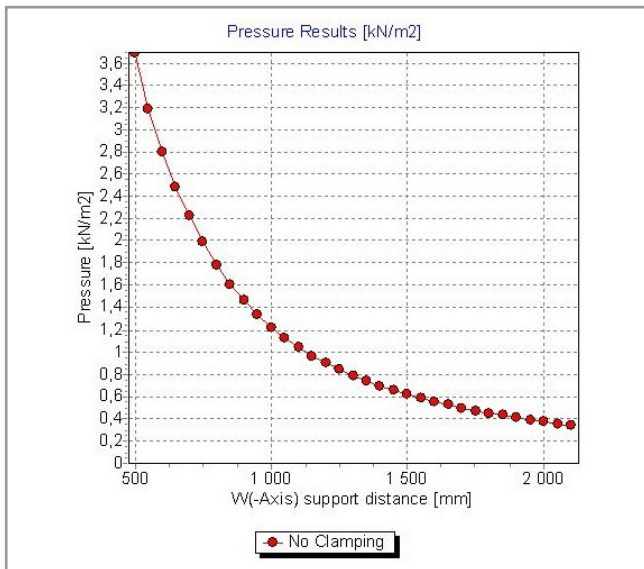
2 sides supported parallel to the length



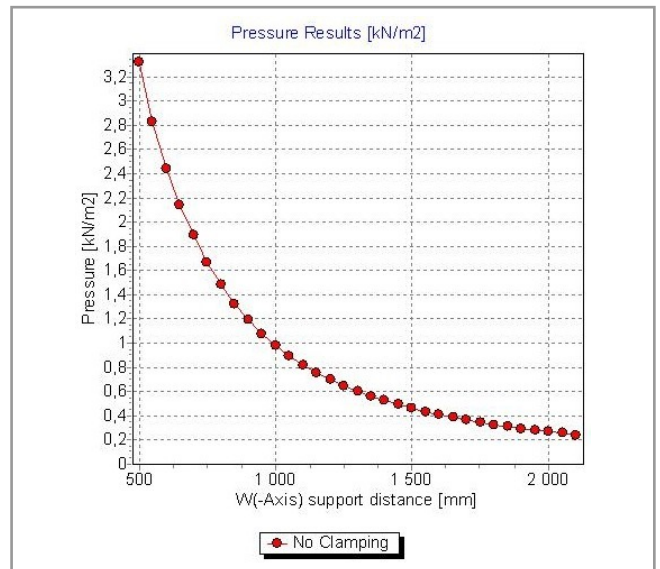
4 sides supported for the frame length 2100 mm



4 sides supported for the frame length 3150 mm



4 sides supported for the frame length 4000 mm



### Legend

Maximum displacement	65 mm
Span	0,2
Maximum pop-out	15 mm
Safety factor	1
Panel width 2 sides supported	1300 mm
Panel width 4 sides supported	2100 mm

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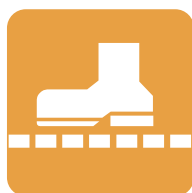
# Installation Guide

MULTICLEAR® sheet needs to be installed according to prescribed and commonly used practices. For most roofing applications, the sheet will either need to be installed flat, with a minimum slope of 5 degrees, or curved. In this last case, it is important not to overstretch the sheet as this will cause premature failure due to cracking. It will also increase the damaging effect of any UV attack as well as hail stones damage.



## STORAGE

MULTICLEAR® sheet should be protected from atmospheric influences like sun and rain, preferably by storing them inside. They should be covered with the white protective PE film until just before installation. The edges should remain taped to prevent dust to enter. The sheet must be stored horizontally on wooden pallets with a maximum load of 1000kg and no more than 3 pallets should be stacked on top of each other.



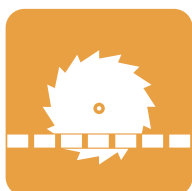
## SAFETY

During installation of MULTICLEAR® sheet all necessary arrangements should be taken to ensure safe working conditions in line with the health and safety or SHE regulations. Never walk on the sheet during installation or maintenance. Use appropriate boards, placed on the purlins, to support the weight. When lifting sheets on to the roof, use wide belts to distribute the load correctly.



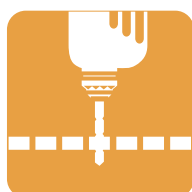
## HANDLING

MULTICLEAR® sheet should be handled with care to prevent damage and scratching. Lifting with forklifts must always be done on the wooden pallets as support, never directly on the sheet. The masking film protects the sheet surface against scratches and should be removed only just prior to the actual installation. Never walk on a stack of sheet.



## SAWING

MULTICLEAR® sheet can be cut by standard cutting equipment. Special fine toothed blades, that are suitable for plastics, are recommended. The masking film should be left on the sheet during sawing to prevent scratching. The cut must be free of notches. The channels should be blown free from dust with compressed air and taped again. Hot knife cutting is best to prevent dust.



## DRILLING

Holes can be drilled in MULTICLEAR® sheet with high speed power drills using appropriate tooling. The sheet should be supported during drilling to prevent vibration. The holes should be kept clean and care should be taken to prevent any dust to enter the channels. The fixing holes must be drilled oversize to allow for thermal expansion of the sheet after installation. The recommended hole diameter is 18mm. The drilling must be free from notches.

# Installation

MULTICLEAR® sheet needs to be installed according to prescribed and commonly used practices. For most roofing applications, the sheet will either need to be installed flat, with a minimum slope of 5 degrees, or curved. In this last case, it is important not to add more over stretch the sheet as this will cause premature failure due to cracking. It will also increase the damaging effect of any UV attack as well as hail stones damage.

## 1| Sawing

MULTICLEAR® sheet can be cut by standard cutting equipment. Special fine toothed blades, that are suitable for plastics, are recommended.

The masking film should be left on the sheet during sawing to prevent scratching. The cut must be free of notches. The channels should be blown free from dust with compressed air and taped again.

Knife cutting is best to prevent dust.

## 2| Drilling

Holes can be drilled with high speed power drills using appropriate tooling.

The sheet should be supported during drilling to prevent vibration.

The holes should be kept clean and care should be taken to prevent any dust to enter the channels. The fixing holes must be drilled oversize to allow for thermal dilatation of the sheet after installation (see thermal expansion calculation). The drilling must be free from notches.

## 3| Handling

MULTICLEAR® sheet should be handled with care to prevent damage and scratching. Lifting with forklifts must always be done on the wooden pallets as support, never directly on the sheet.

The masking film protects the sheet surface against scratches and should be removed only just prior to the actual installation.

Never walk on a stack of sheet.

## 4| Bending Radius

The minimum radius that can be used when cold curving or bending MULTICLEAR® sheet is

$$R = 150 \times \text{Sheet thickness}$$

In the case of a light dome or barrel vault, the bending radius can be calculated as follows

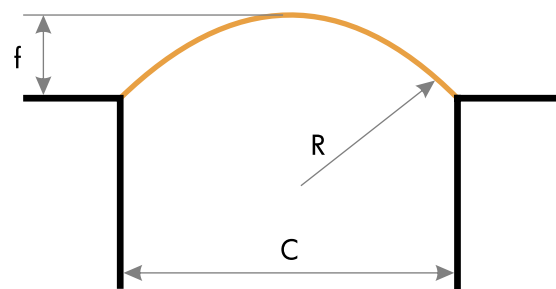
$$R = \frac{(c/2)^2 + f^2}{2f}$$

With

R = radius

c = chord or vault opening

f = chamber or bending height



## 5| Thermal Expansion

A very important factor to consider when installing MULTICLEAR® sheet is the thermal expansion. Polycarbonate has a higher thermal expansion coefficient compared to natural building products. Therefore sufficient room needs to be provided in the fixing profiles to allow for this thermal expansion. Also when drilling holes through the sheet for fixing, the necessary oversize needs to be considered in order to avoid cracking and overstretching of the sheet with higher temperatures.

The thermal expansion coefficient of MULTICLEAR® sheet is

$$\alpha = 0.065 \text{ mm/m} \cdot ^\circ\text{C}$$

and therefore the thermal expansion is

$$\Delta L = \alpha \times L \times \Delta T$$

with

$\Delta L$  = total thermal expansion of the sheet

$\alpha$  = thermal expansion coefficient

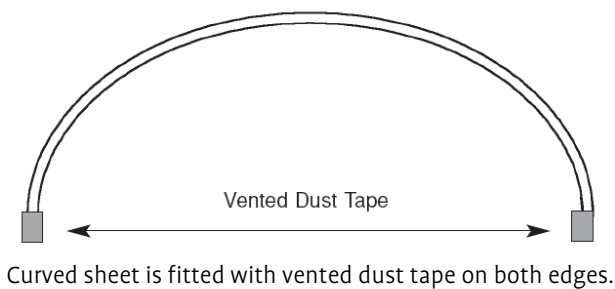
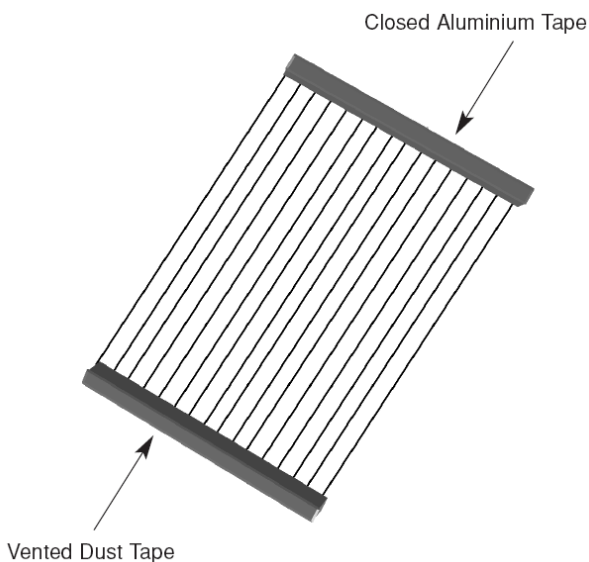
$L$  = length of the sheet

$\Delta T$  = temperature difference in  $^\circ\text{C}$

### 7| Taping

Before installing the sheet in the profiles, care should be taken to prevent contamination of the internal channels. Therefore the channels need to be closed with an adhesive tape. This tape will prevent dust and water to enter the sheet and cause optical problems.

However, in case moisture should enter, it is necessary to foresee a method to allow venting of the channels. Therefore special tapes can be supplied that have a porous section, allowing moisture to escape, but preventing dust to enter. Such tape should be used only on the lower edge of the sheet, while on the upper edge, closed aluminium tape should be used.



Curved sheet is fitted with vented dust tape on both edges.

### 8| Wind and Snow Loads

MULTICLEAR® sheet is affected by wind and snow. It will bend under pressure and care needs to be taken to select the proper support design to avoid breakage or so-called “pop-out” from the fixing profile.

The mechanical deformation under load is dependent on the type sheet, its thickness, the support width and length, and the climatological conditions at the building site. In most case the wind and snow load conditions are prescribed by building regulations in place at the location of the building. It is important that these building regulations are carefully followed when installing MULTICLEAR® sheet.

Only as an indication of wind load calculation, following formula can be used

$$q = 0.625 \times V^2$$

With

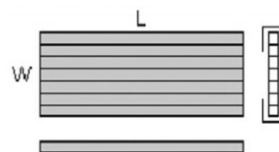
$$q = \text{wind pressure or load (N/m}^2\text{)}$$

$$V = \text{wind velocity (m/s)}$$

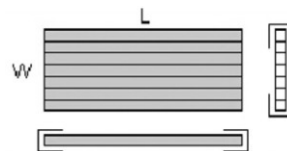
With certain conditions like high buildings, valleys etc. a safety factor of 2 should be used. In any case it is the responsibility of the architect to estimate the actual loads and safety factors.

The following graphs give the mechanical deformation under load per type of sheet. They are examples only. Detailed calculations are available from Arla Plast and should be used on a case by case basis.

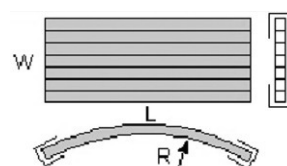
2 sides supported along the length



4 sides supported

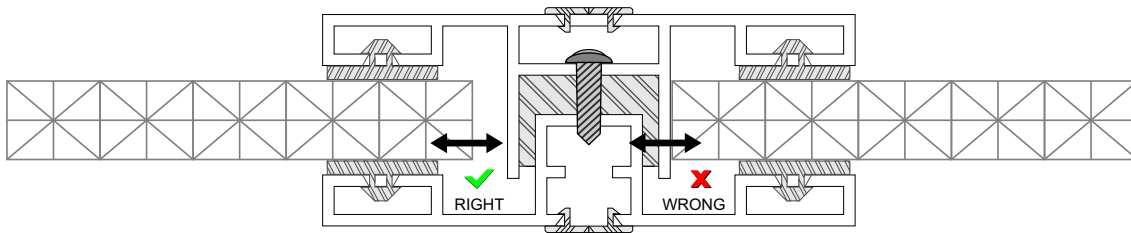


4 sides supported curved

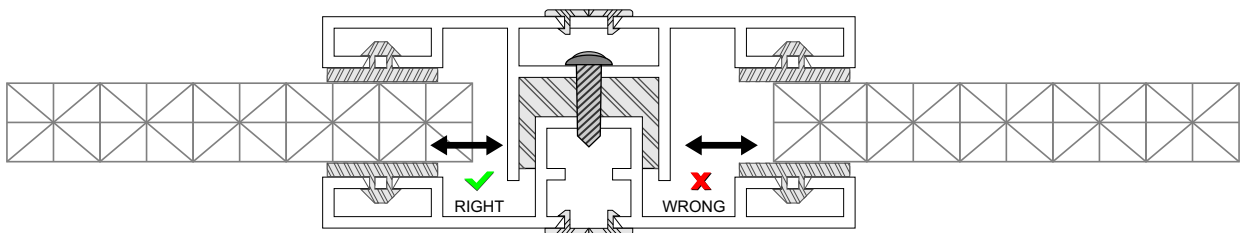


## 6| Glazing Bars

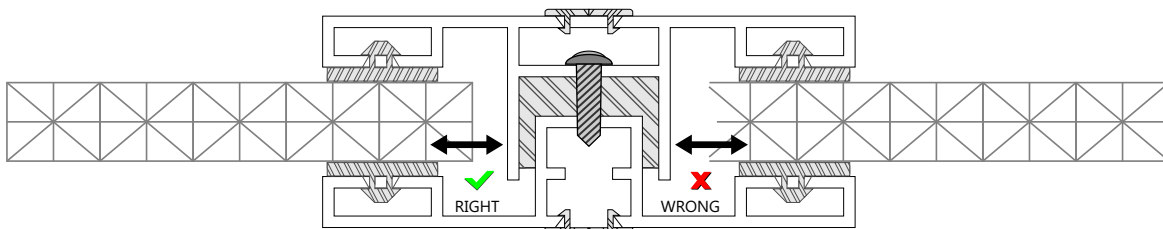
For the correct installation of MULTICLEAR® sheet it is important to observe the correct instructions when fitting the sheets in the glazing bars and support profiles.



The sheet should be installed to allow the thermal expansion as calculated according to the formula in previous paragraph.



Wind and snow load provoke mechanical deflection of the sheet. This results also in a reduction of the width inserted in the glazing bar. Excessive loading therefore can cause the so-called “pop-out” of the sheet out of the profile. In order to prevent this from happening, the insertion in profile should be minimum 20mm.



In order to guarantee maximum clamping force, the sheet should not be clamped with open edges. This weakens the clamping and will cause pop-out.