

## Technical Data (v. 10-15) **KOKOWALL®** Noise Barrier



*Kokowall Noisebarrier 2,5m height in Ommen*

## A) General Information Kokowall Noise Barrier



*Noise barrier at Enschede - length: 450 metres - height: 4,5 metres*

A Kokowall noise barrier radiates warmth and befits any landscape: these are its most typical features. Kokowall is a noise barrier that can be covered with plants; its exterior has been treated with natural and durable coconut fibres. Besides a substantial sound absorption ability, coconut fibres represent the ideal point of attachment for climbers. Within a few years' time, a Kokowall noise barrier will be fully grown over.

The Kokowall noise barrier has been constructed modularly which guarantees a quick assembly process. Prefab panels placed within a steel construction of HE-A columns allow for climbers to be planted on both sides of the barrier. The Kokowall noise barrier's simple construction turns each job into a quick assembly project as well as an economical one.



*Kokowall Noisebarrier in Enschede, l=200m 5m height.*

The Kokowall barrier is a lightweight noise barrier. This barrier absorbs sound and insulates very well despite its limited panel mass of 25 kg/m<sup>2</sup>.

The panels were tested at the TNO institute at Delft and can be supplied in several sizes. The Standard panel has an, Absorption (A) category for noise barriers.  $D_{1a} = 7\text{dB}$ , (cat. A2, EN norm 1793-1 for noisebarriers). The High Absorbative panel has an extra sound absorption layer of mineral wool applied in the panel. ( $>11\text{dB}$  cat. A4. EN-1793-1)

A well thought out construction: A sound insulating plate locked between two rows of sound absorbing coconut fibre sticks makes for a kind of "sandwich construction" that guarantees an insulation  $R_w$  of 30dB. The regular Kokowall barriers together with a sound insulating plate fall into sound insulation category B3, EN 1793 standard.

A heavier sound insulating plate can be applied if a very high noise reduction is required. The Kokowall barrier is also available as a visual barrier without the noise insulating properties. This barrier comes equipped with one row of tubes without an insulating plate and serves as a visual partition.



*Kokowall Noisebarrier in Vianen, l=200m 3-6m height*



## **B) Advantages of the Kokowall Noise Barrier®**

The application of coconut fibres ensures unique product features. The advantages of the Kokowall noise barrier are outlined below.

### **Lightweight Construction**

Concrete barriers or banks cannot be placed everywhere due to their weight and size. The foundation of the Kokowall noise barrier is actually very narrow, thereby ensuring relatively little loss of space. The lightweight and modular construction of the Kokowall noise barrier ensures a quick, low-cost assembly process.

*Kokowall Noisebarrier in Amsterdam Z-O, H=3m*



### **"Graffiti-unfriendly"**

A significant disadvantage to the mostly smooth concrete constructions is their "graffiti-friendly" surface. Removing graffiti can cost as much as € 10,000 without the guarantee of there being a spotless wall the next morning. The Kokowall barrier however does not make for a very graffiti-friendly surface, as said surface is diffuse; also, the graffiti does not adhere well to the very absorbing coconut fibres. In case the Kokowall barrier is sprayed on then the graffiti can be hidden from view by having the barrier grown over with climbers as mentioned earlier.

### **Greenery**

Kokowall barriers are very suitable for overgrowth by climbers (f.e., the Hedera climber). Climbers adhere well to coconut fibres as said fibres represent a natural environment for aerial roots.

The Kokowall barrier will look very natural by having it grown over; also, the construction will not affect the appearance of already present greenery.



*Kokowall Noisebarrier in Weert H=3m, l=50m*

### **Decorative Aspects**

Kokowall's decorative barriers and noise barriers are one with their surroundings. The material allows the client to design creatively. We will gladly assist you in the design and assembly process.

### **Competitively Priced**

Compared to traditional concrete noise barriers, the Kokowall barrier is competitively priced. This makes the barrier affordable to persons who, despite their approved noise control situation, still experience noise nuisance. A price estimate is provided by means of a quote.

## **C) Product Information**

- Designs:** A Kokowall noise barrier can be supplied "made to measure" up to 6 metres in height (or higher) starting from the ground level. In addition, there are several different finishes to choose from:
- Mesh panelling: panels are treated on one side with galvanised steel mesh
  - Kokowall panels are either combined - or alternated - with acrylic plates
  - Powder-coated, steel construction and framework of panels
- Synthetic material:** The pipes are made of a tough synthetic material (recycled ABS) without PVC. In turn, this synthetic material can easily be recycled. The crash-resistant pipes are manufactured onsite at Kokosystems thereby maintaining a constant quality standard.
- Coconut:** Coconut fibres derive from the coconut shell. It is therefore a natural product of the coconut. The quality of coconut fibres can be compared with tropical hardwood. Think of a coconut mat at the front door or marine rope. Both require a durable fibre: coconut fibre.
- Decomposition:** Coconut fibres absorb very little water during normal outdoor usage, which means that the fibres will not decompose. The fibres dry quickly, which protects the barrier from the onset of mould or moss.
- Planting:** Kokosystems supplies metal clamps with which all sort of plants can easily be fastened to the Kokowall barrier. By means of the clamps, the barrier can "turn green" instantly. For example, 2-metre high Hedera climbers cover 50% of the barrier, and will cover the barrier completely within a short time-span.
- Greenery:** Hedera climbers or vines hardly require upkeep as far as pruning is concerned. The Hedera first climbs vertically, after which it will tilt without extra support. The Passion plant is also an excellent choice for this purpose.
- Fireproof:** The coconut fibres are impregnated with Firestop, which is an ecologically sound, fireproof application. The coconut fibres therefore fall into flame spread category 1, NEN 6065 standard.
- Maintenance:** The Kokowall barriers are basically maintenance free. In time, the coconut fibres will turn lighter in colour due to sun exposure. However, the fibres will maintain their natural look and remain tough.
- Recycling:** Nothing but fully recyclable materials are applied in the design and construction of Kokowall noise barriers.
- Placement:** Specialised VCA-certified contractors execute the placement of the barriers.
- CE marking:** The Kokowall Noisebarrier is produced conform CE norm EN 14388: 2005

## D) Specifications of Parts & Materials

### Dimensions and pattern Kokowall Barrier:

- Standard pattern:  $w_{\text{pattern, standard}}$  = panel width: 2,490, 2,960 mm or 3.960mm (hart on hart 2.500mm, 3.000mm or 4.000mm)
- Maximum pattern dimensions:  $w_{\text{pattern, max.}}$  = width: 5,000 mm (with H=1,25m)
- Maximum height:  $h_{\text{max}}$  = 6 metres ( 4 stacked panels)
- For a Kokowall noise barrier measuring higher than 2,20 metres (starting from the ground level) the height is divided into 2 or more stacked panels.

### Steel Construction:

- *Style of column:*  
Taking into account the barrier's height, IPE or HE-A 120 to HE-A240 – S235 hot-dip galvanised (EN1461) with a slotted top plate, diameter 15-30 mm, DIN 17100 quality standard. Optional powder coating in any desired colour.
- *Foundation columns:*  
Taking into account the barrier's height, HE-A 120 to HE-A 240, S235 hot-dip galvanised (EN1461 standard) with a slotted top plate, diameter 15-30 mm, DIN 17100 quality standard.

### Panels:

- Framework made of cold-rolled U-80-50-3, profile S235, hot-dip galvanised (EN1461), quality standard DIN 17100.  
Sound insulation, single number descriptor reading - NEN-EN-ISO-717-1:  $R_w = 30\text{dB(a)}$  - NEN 1793-2, Category B3 (top category for sound insulation). Please see attachment TNO Sound Insulation reading.
- Standard panel: Absorption by means of  $DL_{..} = 7\text{dB(a)}$  - NEN 1793-1, category A2. Please see attachment TNO, sound absorption reading.
- High Absorbative panel: Absorption by means of  $DL_{..} = >11\text{dB(a)}$  - NEN 1793-1, category A2. Please see attachment TNO, sound absorption reading.
- Mass of panels: 25 –35 kg/m<sup>2</sup> depending on applied insulation plate: 25-35 kg/m<sup>2</sup>
- Dimensions panels:
 

Standard width panel :	$w_{\text{panel, stand}}$	= 3.960mm or 2,960 or 2.480mm
Minimum Specification of size		= 5mm (width & height)
Maximum width panel:	$w_{\text{panel, max}}$	= 4,960 mm
Allowable placement tolerance:	$T_{\text{pl. panel}}$	= 40 mm (in relation to $w_{\text{pattern}}$ )
Maximum height panel:	$h_{\text{panel, max}}$	= 2,200 mm

### Joint materials:

- Top plate or bolster for each column:
  - 4 x M16-30 x 80 hexagon bolt quality 8.8 "THVZ" hot-dip galvanised
  - 8 x Washer M16-30 - DIN 933 "THVZ" hot-dip galvanised
  - 4 x Bolt M16-30 - DIN 934 "THVZ" hot-dip galvanised
- Attachment panels, per item:
  - 8 x self-tapping hexagon shoulder pin ST.6,3 x 38 mm - DIN 7405K

### Synthetic material:

- Recycled fire-retardant ABS, pipes diameter  $\varnothing 32$  mm, wrapped in coconut fibres.
- Compriband AC self-adhesive cellular rubber, 15 x 5 mm between stacked panels.

### Coconut:

- Only the longest and durable mattress fibres are applied.
- The applied coconut fibres are checked continuously in order to guarantee an EC (saline) content of  $< 0,5\text{mS/cm}$ .
- Coconut fibres serve as a bonding substrate for several climbers' aerial roots.
- Treated with Magma Firestop. Fireproofed according to NEN 6065 Flame Spread Category 1.



## ***D) Installation Data Kokowall Noise Barrier (applicable to 3-metre high barrier)***

In the summary below, several activities pertaining to the installation of a 3-metre high Kokowall noise barrier - on land that is ready for building - are listed.

1. Columns HE-A 160 with a top plate and slots are drilled into the ground down to a depth of 4.000 mm.
2. On top of the foundation columns, superstructure columns are equipped with a top plate using an M16 bolt. The top plate's slits and the bolster's slits are at a right angle, allowing the columns to be placed horizontally in both directions.



3. By means of 0,5 mm thick jaw chucks, which are inserted between the top plate and bolster of the columns, the flange posts are placed vertically.
4. After the steel construction has been installed, a prefab, 200 mm high concrete component is inserted between the HEA columns' flanges.
5. After the installation of the concrete border, the Kokowall sound panels (see drawing) are hoisted via the top between the flanges. Two panels measuring each 1,400 mm high, are used for a 3-metre high structure and placed on top of each other (see drawing no. 2). Between the panels the concrete border and the lower panel, compriband sealant rubber is inserted.
6. By means of St. 6.3 x 38 self-tapping hexagon bolts, the panels are attached to the inside of the front flange of the column thereby creating an airtight

construction (see drawing).

7. Possible cracks at the underside (of the concrete border) are sealed with soil/dirt. After the panels are installed, plants can be fastened with specials clamps. The aerial roots of all sorts of climbers attach very well to a Kokowall noise barrier. Within a few years' time, the barrier will be completely grown over

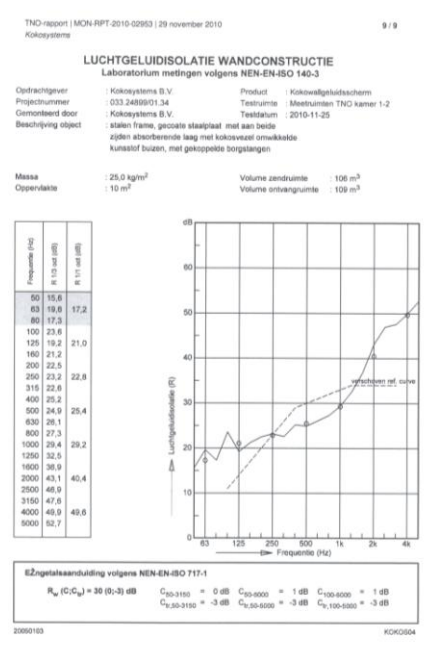
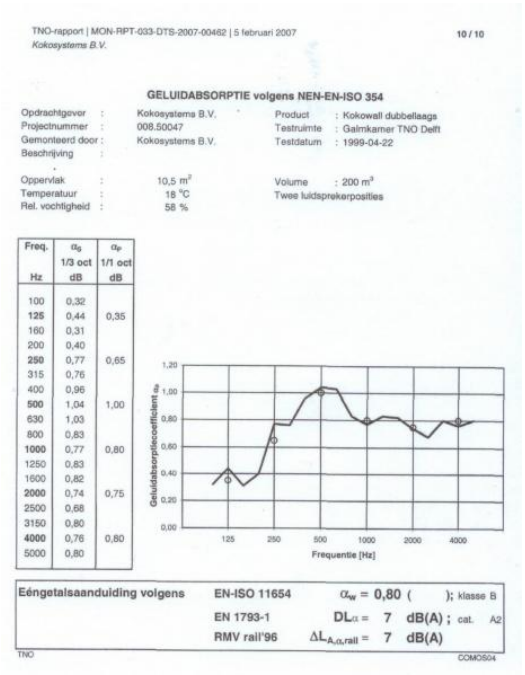


*Installation of uprights*



*Installation of panels*

**D) Acoustic Data Kokowall Noise Barrier Akoestische gegevens Kokowall geluidsscherm**



Prefab kokowall panel	Absorption $D_w$ (in dB)
Kokowall Standard	7dB
Kokowall Extra absorption	≥11dB

Prefab kokowall panel	Noisereduction $R_w$ (in dB)
Kokowall Noise barrier panel	30dB





**E) Reference List Kokowall Noise Barriers**

Client	City	Projectlocation	Height	Lenght	m2	Year
Gemeente Enschede	Enschede, Ov.	Europalaan	5m	204m1	1020	2007
Gemeente Tilburg	Tilburg, prov Brabant	Witbrant	2,6-4,3m	350m1	1370	2007
Gemeente Beilen	Beilen, prov Drenthe	De paltz 11	2,5m	125m1	313	2007
Intratuin Heerhugowaard	Middenweg A.1	Heerhugowaard	4,2m	88m1	370	2008
Project Tilburg 2	Tilburg, prov Brabant	Koolhoven	2,5m	268m1	670	2008
Gemeente Enschede	Enschede, Ov.	Rijksweg 35	2,25-4,5m	480m1	2080	2008
Gemeente Leiderdorp	Leiderdorp	Persant Snoepweg	1,5m	96m1	144	2009
Mostert De Winter	Berkel en Rodenrijs	Rodenrijseweg 133	3,7m	84m1	311	2009
J. den Breejen Aannem.	Austerlitz	Oude Postweg	4m	87m1	348	2009
Prov. Gelderland	Doetinchem, Gld	Oude Terborgseweg N317	1-3,5m	218m1	451	2009
Gemeente Lelystad	Lelystad, Fl.	De Zoom	2m	268m1	536	2009
Coop Distributiecentrum	Monster	Havenweg 48	4m	145m1	580	2009
Gemeente Zoeterwoude	Zoeterwoude	Meerburg	4m	168m1	672	2009
Timmerhuis GWW	Ermelo	Heidelaan	4m	208m1	832	2009
Gemeente Lelystad / Mowi NL	Lelystad, Fl.	Westerdreef	0,9-2,6m	641m1	900	2009
Pro Rail	Dorst	Spoorstraat	1,5-3m	790m1	1467	2010
Thunnissen Projectontwik.	Benthuizen	Benthoek	6m	105m1	630	2010
Noise Solutions	Kapellen Van Wellen bouwbed	Klinkaardstraat	3m	277m1	831	2010
Heras-Adronit GmbH	Essen	Fulerumer Straße	3m	300m1	900	2010
Noise Solutions	Mechelen	Mechelse Veiling	3-6m	129m1	486	2010
Janssen & de Jong	Stramproy	Industrieweg	2m	142m1	284	2010
Gemeente Langedijk	Langedijk	Uitvalsweg	1,6m	174m1	278	2010
Vaessen Bouwbedrijf	Weesp	Brandweerkazerne	2,2m	46m1	101	2010
Gemeente Weert	Stramproy	Industrieweg.	2m	173m1	346	2010
Westerscheldetunnel NV	Borsele	Tolplein Westerscheldetunnel	1m	470m1	470	2010
Slingeland Ziekenhuis	Doetinchem, Gld	Slingeland Ziekenhuis	3m	220m1	660	2010
Aacoustic	Parijs Frankrijk	Golfbaan Oost Parijs	1,2m	600m1	720	2010
Noise Solutions	Kapellen, Van Wellen	Bedrijfsterrein van Wellen	3m	277m1	831	2010
Gemeente Essen/ Heras SKS	Essen Duitsland	Essen, Fulerumer Str.	3m	300m1	900	2010
Clark & Spears UK	Weymouth, UK	Weymouth run A & B	2m	500m1	1000	2010
Heras SKS	Vechta Duitsland	Stad Vechta	3,4m	330m1	1122	2010
Clark & Spears UK	Slough Data Centre	LITE	8m	184m1	1472	2010
Mostert De Winter	Spijkenisse	Baljuwlaan	1,6m	100m1	160	2011
Kienhuis Bouw	Nieuw-Amsterdam	Aldi	2m	58m1	116	2011
Gem. Nijkerk	Nijkerk	Beekhoven	2m	170m1	340	2011
Rijkswaterstaat	Halfweg	N200 thv Dr. Baumannplein	1,05m	281m1	295	2011
Reef Infra	Zuthphen - Eefde	Rotonde N229	1,8m	50m1	90	2011
Twente Weg & Waterbouw	Hengelo - Denekamp	Schipleidelaan	1,5-2,5m	56m1	120	2011
Mostert De Winter	Maarschalkerweerd	Atletiekbaan	2m	130m1	260	2011
Provincie Utrecht	Werkhoven	Langs N229	1,4m	40,6m1	57	2011
Vlaamse Overheid	Heusden - Zolder	E314	3,5-5m	876m1	3807	2011
Ruimte voor Ruimte CV	Hilvarenbeek	N269	3,25m	395m1	1284	2012
Gemeente 's-Hertogenbosch	's-Hertogenbosch	Terrein Hekellaan	2,5m	47m1	117	2012
Van Dijk Maasland b.v.	Maassluis	Cornelis van der Lelylaan 1	2,5m	150m1	375	2012
BAM Wegen b.v.	Assen	Alteveerstraat, de Kolk	2,5m	162m1	405	2012
Boskalis b.v.	Gouda	N207, sluiseland	3,7m	86,4m1	320	2012
Schagen Infra b.v.	Zwolle	Merwedelaan	1m-2m	169m1	325	2012
Noise solutions	Brecht	E19	4,5m	828m1	3726	2013
Schot Infra	Warmenhuizen	Buitenterrein Vezet	7m	104,5	731,5	2013
Novaform b.v.	Berkel-Enschot	Molenstraat	2m	450m1	900	2013
De Koornbeemd	Oss	N329	2m	155m1	310	2013
Reanco	Vught	De Heun	2m	280m1	560	2013
Ranzijn Tuincentrum	Alkmaar	Omval 55, Alkmaar	4m	44m1	176	2013
RVB Infra	Zaandam	Westknollendam 121a	2,5m	116m1	290	2013
Bouwbedrijf Karsten	Hardenberg	Hessenweg 51	6m	131m1	786	2013
Ballast Nedam	Zoetermeer	Diverse locaties	1,1 - 2,8m	1500m1	3300	2013
Verhoeve Infra	Wehl	N815	1,5m	115m1	172,5	2013
Provincie Limburg	Einighausen	N294, Mauritsweg 13	2m - 3m	64m1	222	2013
GKB Realisatie	Etten-Leur	De Streek	1,6m	777,5m1	1244	2014
AW Vessies Infra	Castricum	Nieuw Koningsduin	1m	100m1	100	2014
Dura Vermeer Infrastructuur	Zoeterwoude	N206	3m	71,5m1	214,5	2014
Kuhn-Geldrop b.v.	Geldrop	Nuenensweg 165	2m - 5m	383m1	1076	2014
Verhoeve Infra	Doetinchem	Zelhelmseweg	2m	140m1	280	2014
Dura Vermeer Infrastructuur	Almere	Stedendreef	1m - 2m	510m1	650	2014
Schreuder b.v.	Bemmel	N839 Papenstraat	3m - 3,5m	122m1	383	2014
Heijmans b.v.	Diemen	Dr. A.J.J. van Gemertplein	1m-5m	970,5m1	3384	2014
Etam Groep b.v.	Zoetermeer	Oostweg 2	3m-6m	265,9m1	2500	2014
Knipscheer	Bussum	Struiheiweg	1m - 4m	1537m1	5200	2015



