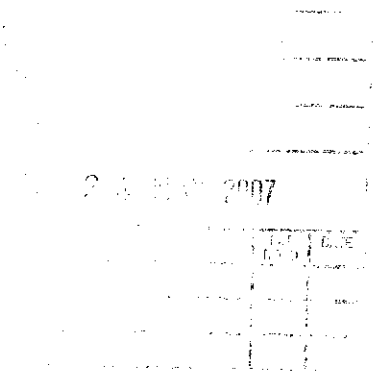
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Project:	Network Rail, Square 1 Manchester			
Client:	WWP Consulting			
Report Title:	Environmental Noise Assessment			
Author:	J A Gillott MIOA		Date:	8th Feb 07
Checked:	P. Dutfield		Date:	8th Feb 07
Revision:	0			
Report Status:	**Issue**			
Reference:	1620_ ENA_1_JG			

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1.0 Introduction

As part of refurbishment to an existing building on a plot of land bounded by Travis Street, St Andrews Street and North Western Street, Manchester, it is proposed that a number of items of mechanical plant be installed within and on the roof of the demise.

Paragon Acoustic Consultants Ltd has been commissioned to conduct an environmental noise survey to obtain statistical noise data to characterise the existing local background and ambient noise climate at the site. This information will be used at the appropriate stage to determine if the proposed new plant selections will meet with the Local Authority noise policy.

The assessments contained within this report will include the principles and recommendations contained within the following documents.

- **BS 8233:1999 "Sound insulation and noise reduction for buildings – Code of practice"**
- **BS 4142:1997 "Method for rating industrial noise affecting mixed industrial and residential areas".**

The client has advised that in certain instances the operational period of the proposed mechanical plant shall be 24 hours.

2.0 Site Description

The plant under consideration will be placed within the demise of the existing building under refurbishment. The building is approximately 70m by 45m in plan, 4 storeys high and lies in a plot of land bordered by Travis Street to the north west, St Andrews Street to the north east and North Western Street to the south.

It is proposed that the chillers /Air Handling unit and Pump enclosure be installed on the roof of the building, whilst the Diesel Generator set will be located in the southern aspect of the building.

The following paragraphs describe the area proximal to the site.

To the west of the site lie the railway tracks associated with Manchester Piccadilly Station, these lying in a north west to south east orientation. The tracks are elevated by an estimated 10 metres above ground level and a number of commercial outlets were noted within the space under the arches of the lines.

To the south of the site building lies a triangular section of land. It is taken that this area will be used for on-site parking when the site is completed. In the extreme south east corner of the site lies a commercial building identified by its signage as a vehicle accessories retail outlet. To the south of the site lies the B6489, Fairfield Street. To the south of Fairfield Street lie various commercial interests including a garage, café, and a shop. Retail outlets were noted under the railway arches including a tool hire shop

To the east of the site lies St Andrews Street, beyond which lies an industrial area comprising various commercial interests. It was noted that Arrive Bus depot is located off St Andrews Square and busses were noted to wait within this street with their engines idling at certain times of the survey.

To the north of the site lies Travis Street, beyond which were various commercial interests including Manchester Van Hire offices, a 3-storey office building and a large Post Office yard and associated buildings.

The site and its adjoining land uses are illustrated by plan in Appendix A.

3.0 Existing Noise Climate

3.1 Road Traffic

Noise emanating from vehicular road traffic was deemed to provide the primary contribution to the ambient noise climate proximal to the nearest affected residential premises. The overall noise comprises both individual "event" type emissions from vehicles passing along local roads, and also continuous low frequency "rumble" due to middle distance traffic flows.

3.2 Rail traffic

Rail traffic was audible during the survey periods, emanating from the activities associated with Piccadilly rail station. Train noise events will have been included within certain of the readings taken.

3.3 Aircraft

Medium / high altitude aircraft overflights were observed and their contribution to the overall noise climate will be included within the measurements taken.

3.4 Mechanical Noise Sources

The new items of mechanical plant were not operating during the period of the survey. A number of plant items were however observed in the immediate vicinity of the site, although it could not be definitively established if these were operating.

4.0 Environmental Noise Survey

4.1 Measurements

The environmental noise survey was carried out generally in accordance with the principles and procedures set out within **BS 4142:1997** "Method for rating industrial noise affecting mixed industrial and residential areas".

For the evening part of the day the noise monitoring commenced on 29th Jan 07 at approximately 16:00 hours and continued for three hours.

For the night time part of the day the noise monitoring commenced on 30th Jan 07 at approximately 00:00 hours and continued for three hours.

For the morning part of the day the noise monitoring commenced on 30th Jan 07 at approximately 07:00 hours and continued for three hours.

The measurements were made at the assessment location as described below.

- **MP1**: In Chapel Town Street
- **MP2**: In Ripley Close
- **MP3**: Travis / Baring St
- **MP4**: Vicinity of site

The measurement location is illustrated on the site layout drawing in Appendix A.

Various statistical broad-band and spectral sound pressure level measurements were obtained during the survey. A measurement time interval T_m = 10 minutes was used for sampling during the day and 5 minutes was used for sampling during the night. Measurements of the percentile level $L_{A90,T}$ were made using the sound level meter fast time constant (125ms), as per clause 3.10 of BS 4142:1997.

The quantities recorded included:

- **L_{Aeq}: the equivalent continuous noise level over the measurement period**
- **L_{Amax}: the maximum sound pressure level (Fast time-weighting)**
- **L_{A10}: the noise level exceeded for 10% of the measurement period**
- **L_{A90}: the noise level exceeded for 90% of the measurement period**

4.2 Weather during survey period

The weather conditions during the survey were mild, dry and still.

4.3 Alternative measurement locations

It was not possible to measure at 1 metre from all of the surrounding affected property windows, these being potential assessment locations. As such, the background noise levels were monitored within three locations considered to be residential areas nearest the site (MP1, MP2 and MP3) and a position was used at MP4 (see site plan) to determine the likely noise levels in areas immediately surrounding the site.

4.4 Instrumentation

Sound pressure level measurements were obtained using the following instrumentation complying with the Type 1 specification of IEC 60651, IEC 60804, IEC 61260 and IEC 61672:

- **Norsonic Type 118 Sound level analyser, serial number 31322**
- **Norsonic Type 1225 ½" microphone**

Additionally, the following equipment was used:

- **Tripod**
- **Leica laser distance measuring instrument**
- **Camera**

Calibration checks were made prior to and after completion of measurements using a Norsonic Type 1251 acoustical calibrator complying with Class 1 of IEC 942 (1988), calibration level 114.0 dB ± 0.3 dB, @ 1.0 kHz. All instrumentation carries a current manufacturer's certificate of conformance a copy of which is attached to Appendix C.

4.5 Results

The lowest representative daytime and night-time background noise levels obtained are summarised in Table 1.

Table 1: Lowest Background Sound Pressure Level Measurements

Location		Lowest Octave band 1/1 L_{A90} noise levels measured								
	Frequency (Hz)	63	125	250	500	1K	2K	4K	8K	**dB(A)**
MP1	Lowest daytime levels measured (18:00-21:00 and 07:00-10:00)	56	50	47	44	43	37	29	19	**48**
MP1	Lowest night time (00:00-03:00)	50	46	43	40	38	32	26	18	**43**
MP2	Lowest daytime levels measured (18:00-21:00 and 07:00-10:00)	58	56	55	46	43	38	28	19	**51**
MP2	Lowest night time (00:00-03:00)	49	52	47	40	34	31	25	15	**44**
MP3	Lowest daytime levels measured (18:00-21:00 and 07:00-10:00)	60	54	52	47	48	42	31	19	**52**
MP3	Lowest night time (00:00-03:00)	56	53	49	43	40	36	26	16	**47**
MP4	Lowest daytime levels measured (18:00-21:00 and 07:00-10:00)	61	55	51	48	48	44	35	23	**53**
MP4	Lowest night time (00:00-03:00)	51	44	42	38	38	35	26	15	**43**

A summary of the Broadband noise data measured is provided in Appendix B.

5.0 Evaluation of external Noise Criteria

The local vicinity contains mixed commercial and residential premises, both of which must be given due consideration in terms of acceptable levels of noise exposure from the new plant.

5.1 Residential properties.

BS4142:1997 "Method for rating industrial noise affecting mixed residential and industrial areas" describes a method of determining the level of the noise of an industrial nature, together with procedures for assessing whether the noise under investigation is likely to give rise to complaints from persons living in the vicinity. In general, the likelihood of complaint in response to a noise depends upon factors including the margin by which it exceeds the background noise level.

In order to discuss the Local Authority noise policy this practice contacted Mr Robert C L Macdonald, Environmental Pollution Officer for the Pollution Control Section, Environmental Health at Manchester City Council. Mr Macdonald advised their external equipment planning condition to be as follows:

> *"NSE6:*
> *The building, together with any externally mounted ancillary equipment, shall be acoustically insulated in accordance with a scheme submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the equipment. Ancillary equipment should be 5 dB below background(LA90) for all octaves when measured at the nearest sensitive premises facade.*
>
> *Reason: To safeguard the amenities of the occupiers of nearby premises."*

This contacted Mr Macdonald to discussed the definition of: *"when measured at the nearest sensitive premises façade".* It was determined that the criterion applies to commercial properties as well as residential properties and that part of the reason for this was to minimise the increase of noise levels in the area over a period of time and property development, often referred to as "creep"

In addition to the above, the following points were advised:

> *"There are occasions in the City when it may be difficult to achieve the 'all octaves'. Circumstances such as these require particular explanation by the applicant and consideration by Environmental Health."*
>
> *"Emergency generators should have reasonable noise levels. Generally it will be the testing schedule that requires a statement for Environmental Health, our expectation is that, generators are tested at reasonable times of the day such as not to cause nuisance to adjacent residents and/or commercial business"*

5.2 External noise criteria

The derived external noise criteria to which the new building services plant shall be required to achieve are summarised in Table 2:

Table 2: Limiting Noise Criteria Applicable @ at the nearest sensitive premises facade

Location		Lowest Octave band 1/1 L_{A90} noise levels measured								
	Frequency (Hz)	63	125	250	500	1K	2K	4K	8K	**dB(A)**
MP1	Lowest daytime levels measured (18:00-21:00 and 07:00-10:00)	51	45	42	39	38	32	24	14	**43**
MP1	Lowest night time (00:00-03:00)	45	41	38	35	33	27	21	13	**38**
MP2	Lowest daytime levels measured (18:00-21:00 and 07:00-10:00)	53	51	50	41	38	33	23	14	**46**
MP2	Lowest night time (00:00-03:00)	44	47	42	35	29	26	20	10	**39**
MP3	Lowest daytime levels measured (18:00-21:00 and 07:00-10:00)	55	49	47	42	43	37	26	14	**47**
MP3	Lowest night time (00:00-03:00)	51	48	44	38	35	31	21	11	**42**
MP4	Lowest daytime levels measured (18:00-21:00 and 07:00-10:00)	56	50	46	43	43	39	30	18	**48**
MP4	Lowest night time (00:00-03:00)	46	39	37	33	33	30	21	10	**38**

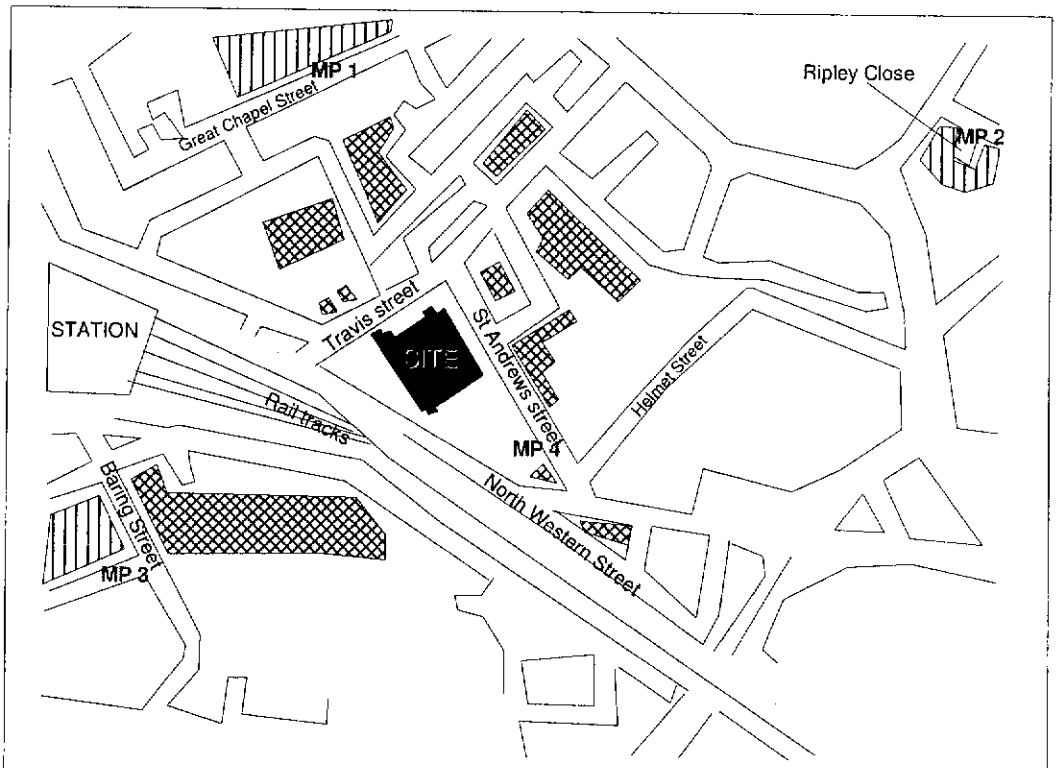
It is taken that this noise criteria applies to third party properties and NOT the clients building under consideration.

6.0 Conclusions

A detailed environmental noise survey has been undertaken to determine the underlying ambient and background noise level climate.

Appropriate external noise criteria have been identified on the basis of Local Authority noise policy, and this will be used in the future selection of mechanical plant and noise mitigation scheme (if necessary) to maintain the prescribed criteria. In this event future reservations with respect to noise emissions from the new fixed mechanical plant would not be expected in relation to the planning application.

Appendix A: Site Drawings



Cross Shaded areas indicate example commercial properties around site

Verticall Shaded areas indicate example residential properties around site

The measurements were made at the assessment location as described below.

- MP1: In Chapel Town Street
- MP2: In Ripley Close
- MP3: Travis / Baring St
- MP4: Vicinity of site

Paragon Acoustic Consultants

DRAWING NOT TO SCALE.

Drawn: JAG

DRAWING TITLE: Plan View Of The Area Proximal To The Proposed Mechanical Plant Location
Date: 08/02/07

Appendix B: Broadband Measurement Data

File	Date	Time		LAeq	LAF(max)	LAF,Perc4	LAF,Perc6
070129_0001.NBF	29/01/2007	18:00-19:00	MP1	64.6	82.6	66.5	49.7
070129_0002.NBF	29/01/2007	18:00-19:00	MP2	56.2	66.4	58.6	51.4
070129_0003.NBF	29/01/2007	18:00-19:00	MP3	61.8	76.1	62.1	59.8
070129_0004.NBF	29/01/2007	18:00-19:00	MP4	66.1	85.8	68.2	54.1
070129_0005.NBF	29/01/2007	19:00-20:00	MP1	57.3	78.1	53	47.9
070129_0006.NBF	29/01/2007	19:00-20:00	MP2	56.1	66.7	59.2	51.7
070129_0007.NBF	29/01/2007	19:00-20:00	MP3	60.4	73.3	62.3	55.2
070129_0008.NBF	29/01/2007	19:00-20:00	MP4	69.1	90.1	70.4	54.2
070129_0009.NBF	29/01/2007	20:00-21:00	MP1	63.9	83.3	63.7	47.6
070129_0010.NBF	29/01/2007	20:00-21:00	MP2	55.3	68.3	57.4	51
070129_0011.NBF	29/01/2007	20:00-21:00	MP3	56	61.1	58.4	51.9
070129_0012.NBF	29/01/2007	20:00-21:00	MP4	65	79.8	69.6	53.5
070130_0001.NBF	30/01/2007	00:00-01:00	MP1	46.2	50.5	47.1	45.3
070130_0002.NBF	30/01/2007	00:00-01:00	MP2	51.7	71.8	50.4	44
070130_0003.NBF	30/01/2007	00:00-01:00	MP3	56.2	67.7	59	49.6
070130_0004.NBF	30/01/2007	00:00-01:00	MP4	59.6	77.2	62.7	43.3
070130_0005.NBF	30/01/2007	01:00-02:00	MP1	45.5	55	47.1	43.2
070130_0006.NBF	30/01/2007	01:00-02:00	MP2	48	59.6	50.1	43.8
070130_0007.NBF	30/01/2007	01:00-02:00	MP3	61.8	78.2	61.8	48.1
070130_0008.NBF	30/01/2007	01:00-02:00	MP4	62.5	80.8	62.6	43.9
070130_0009.NBF	30/01/2007	02:00-03:00	MP1	43.9	48.3	45.5	42.7
070130_0010.NBF	30/01/2007	02:00-03:00	MP2	49.5	67.7	49.9	43.6
070130_0011.NBF	30/01/2007	02:00-03:00	MP3	50.5	59.9	54.7	46.5
070130_0012.NBF	30/01/2007	02:00-03:00	MP4	62.4	78.1	64.3	48.8
070130_0013.NBF	30/01/2007	07:00-08:00	MP4	63.5	75.4	67.8	52.7
070130_0014.NBF	30/01/2007	08:00-09:00	MP4	67.3	82.3	71.3	54.2
070130_0015.NBF	30/01/2007	09:00-10:00	MP4	70	86.6	74.3	53.4

Appendix C: Calibration certificates

Sound Level Meter Calibration Report

Certificate No.:2326

Norsonic Type : 118 Serial no : 31322

Customer:	Paragon Acoustic Consultants
Department:	Regis House
Place:	400 Thames Valley Park Road, Thames Valley Park,
City	Reading RG6 1PT
Customer Order No:	
Contact Person:	John Gillott
Phone/Mail:	

Microphone :	Norsonic	Type : 1225	Serial no : 47988	Sens:-25.46dB
Pre amplifier	Norsonic	Type : 1206	Serial no : 30366	
Calibrator :	Norsonic	Type : 1251	Serial no : 31080	Level:113.98dB

Measured with Pre Amplifier Mains adapter was included

Measurement Results:

Noise Test - IEC 60651 #9.4.1 & 9.4.3	Passed
Level Linearity Test - IEC 60651, #7.9 & 7.10	Passed
Weighting Network Test : A Network - IEC60651 #9.2.2	Passed
Weighting Network Test : C Network - IEC 60651 #9.2.2	Passed
Overload Detector Test : A-Network - IEC 60651 #9.3.1	Passed
Overload Detector Test : Square wave - IEC 60651 #9.3.1	Passed
F/S/I/Peak Test : Steady State Response - IEC 60651 #7.4	Passed
Fast-Slow Test : Overshoot test - IEC 60651 #9.4.1	Passed
Fast-Slow Test: Single Sine Wave Burst - IEC 60651 #9.4.1 & 9.4.3	Passed
Impulse Test : Continuous Sine Wave Burst - IEC 60651 #9.4.3	Passed
Impulse Test : Single Sine Wave Burst - IEC 60651 #9.4.1 & 9.4.3	Passed
Impulse Decay Time Test - IEC 60651 #7.3	Passed
Peak Detector Test, single square wave burst - IEC 60651 #9.4.4	Passed
RMS Detector Test : Crest Factor Test - IEC 60651 #9.4.2	Passed
RMS Detector Test : Continuous Sine Wave Burst - IEC 60651 #9.4.2	Passed
Time Averaging Test: Pulse Range - IEC 60804 #9.3.4	Passed
Time Averaging Test : Averaging Functions - IEC 60804 #9.3.2	Passed
Linearity Test - IEC 804 #9.3.3	Passed
DIN 45 657 : Statistical Distribution Test - According to DIN45 657 #3.3	Passed

Environmental conditions:

Pressure :	Temperature :	Relative humidity :
101.254 kPa	22.2 °C	50.6 %RH

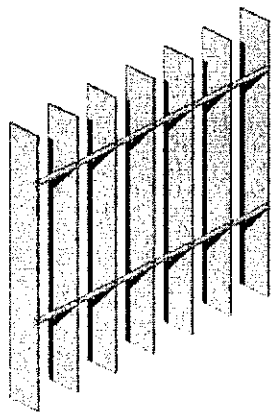
Date of calibration: 11/09/06
Date of issue: 11/09/06
Supervisor: Ian Campbell MSc MIOA

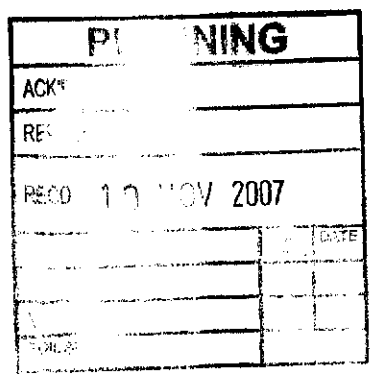
Campbell Associates

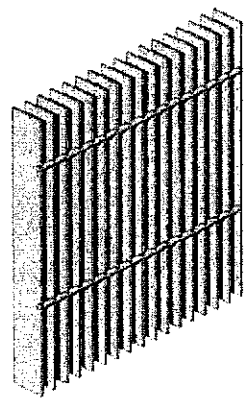
POTISSIMUM ARCHITECTURAL GRATINGS

Composition & Manufacture
Mild Steel—EN10025: 1995 S235JR
Gratings are manufactured in large mat sizes using an advanced electrofusion process. Flat bearing bars are fused with round transverse bars, amalgamating the metals in a single process for strength and complete integrity, without any unsightly welding.
Supply
All products are available as custom-sized framed panels, hot-dip galvanized to BS EN ISO 1461:1999 before optional polyester powder coating to BS 6497:1984 in any RAL colour, or as self-coloured mats for fabrication.

Applications	Recommended Products	Standards/Guidelines
Balconies and Balustrades	34x100mm	NHBC anti-climb Guidelines: <35mm aperture width
Screening Panels and Wall Cladding	All	
Anti-projectile Screens	25x24 and 25x76mm	Network Rail Standard: <25mm aperture
Barrier Fencing for Stadia and Crowd Control	25x76mm	
Pedestrian Grating, Stairs and Balcony Decking	11x76 and 15x76mm	Heel-proof
Vehicle Loadings	Dependent on span	Consult Loading Tables
Industrial Flooring	22x76and 30x76mm twisted square bar	EN14122: 22mm and 35mm ball compliant

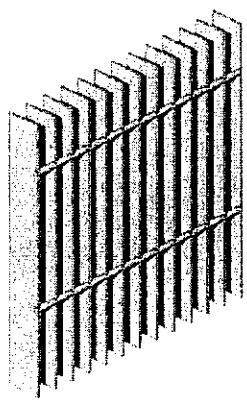


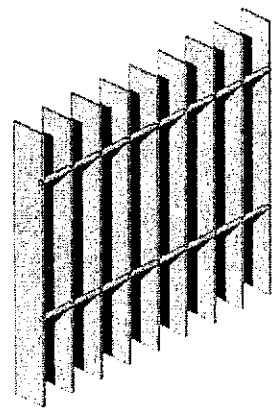




POTISSIMUM© 34X100				
MESH (mm)	FLAT BAR (mm)	ROUND BAR (mm)	MAT SIZE (mm)	WEIGHT (kg/m²)
34x100	25x2	4Ø	6100x1164	13.2

POTISSIMUM© 11X76				
MESH (mm)	FLAT BAR (mm)	ROUND BAR (mm)	MAT SIZE (mm)	WEIGHT (kg/m²)
11X76	25x2	4Ø	6100x1005	36.0





POTISSIMUM© 15X76				
MESH (mm)	FLAT BAR (mm)	ROUND BAR (mm)	MAT SIZE (mm)	WEIGHT (kg/m²)
15X76	25x2	4Ø	6100x1000	27.4
15X76	30X3	5Ø	6100x1000	49.1

POTISSIMUM© 25X76				
MESH (mm)	FLAT BAR (mm)	ROUND BAR (mm)	MAT SIZE (mm)	WEIGHT (kg/m²)
25X76	25x2	4Ø	6100x1000	17.2
25X76	30X2	4Ø	6100x1000	20.4

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POTISSIMUM ARCHITECTURAL GRATINGS

NON-STOCK PRODUCTS

Potissimum grating mats can be ordered in additional mesh sizes and with a variety of flat bars. 6-weeks should be allowed for delivery.

MESH (mm)	FLAT BAR (mm)	ROUND BAR (mm)	MAT SIZE (mm)	WEIGHT (kg/m²)
34x76	30x3	5Ø	6100x1000	24.5
25x76	30x3	5Ø	6100x1000	30.7
25x76	40x3	5Ø	6100x1000	40.3
25x76	50x4	6Ø	6100x1004	67.4
25x76	60x4	6Ø	6100x1004	80.2
25x76	70x4	6Ø	6100x1004	93.0
25x24	25x2	4Ø	6100x1000	19.7
22x76	25x2	4Ø	6100x1000	19.5
17x76	25x2	4Ø	6100x1000	24.3
15x76	30x2	4Ø	6100x1000	32.7
15x76	40x3	5Ø	6100x1000	64.8
15x76	50x3	5Ø	6100x1000	80.5



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