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European Technical Assessment

ETA 09/0035
of 15/06/2014

I General Part

Trade Name	Norjoist Nordic Joist
Product Family to which the Construction Product Belongs	EC PAC 13
Manufacturer	Nordic Engineered Wood Windsor Station, Suite 504 1100, Avenue des Canadiens-de-Motreal Montreal Quebec H3B 2S2
Manufacturing Plant	Nordic Engineered Wood Windsor Station, Suite 504 1100, Avenue des Canadiens-de-Motreal Montreal Quebec H3B 2S2
This European Technical Assessment Contains	15 pages including 5 Annexes which form an integral part of this assessment.
This European Technical Assessment is issued in accordance with Regulation (EU) No. 305/2011, on the basis of	ETAG 011, edition January 2002, used as European Assessment Document (EAD)

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

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II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical Description of Product and Intended Use

1.1 Technical Description of the Product

Norjoist (also trading as Nordic Joist) beams are I-shaped wood-based composite joists. The flanges are produced from planed-all-round (PAR) softwood timber which is finger-jointed. Whilst the majority of the timber is graded in accordance with North American MSR rules some is visually graded with its reference design values being based on the provisions of ASTM D1990.

The web is formed from 9.5mm thick Norbord OSB which is APA graded. The OSB is placed in the beams in sections and 'v' or butt jointed to form a continuous web. The flanges and the web are glued together using Ashland WD3-A322/CX-47 adhesive whilst the flange-flange and web-web joints are made using Ashland UX-100/WD3-A322 adhesive. This ETA covers joist sizes given in Table A1.1 of Annex 1.

2 Specification of the Intended Use in Accordance with the Applicable EAD

Norjoist beams are intended for use as floor or flat roof joists in building constructions. With regard to moisture behaviour of the I-joists the use is limited to service class 1 and 2 conditions as defined in Eurocode 5. Under these conditions, where the moisture content does not exceed 20%, the moisture content of OSB will not exceed 14%, The joists may be taken to have a service life of 50 years, provided that there is no mechanical damage or insect attack. (See section 4.7).

3 Performance of the Product and References to the Methods Used for its Assessment

BWR	ETAG Clause No.	Characteristic	Assessment of Characteristic
1	**4.1**	**Mechanical Resistance and Stability**	**See ETA Section 4.1**
2	**4.2**	**Safety in Case of Fire**	**See ETA Section 4.2**
	4.2.1	Reaction to Fire	See ETA Section 4.2.1
	4.2.2	Resistance to Fire	See ETA Section 4.2.2
3	**4.3**	**Hygiene, Health & the Environment**	**See ETA Section 4.3**
	4.3.3	Release of dangerous substances	See ETA Section 4.3.1
4	**4.4**	**Safety in Use**	**See ETA Section 4.4**
5	**4.5**	**Protection against Noise**	**See ETA Section 4.5**
6	**4.6**	**Energy Economy & Heat Retention**	**See ETA Section 4.2**
	4.6.1	Thermal Resistance	See ETA Section 4.6.1
7	**-**	**Sustainable Use of Natural Resources**	Not Relevant
-	**-**	**General Aspects Related to the Performance of the Product**	**See ETA Section 4.7**

4 Methods of Verification

4.1 Mechanical Resistance and Stability

The following aspects of performance are relevant to this essential requirement for the I-joists.

4.1.1 Mechanical Resistance and Stiffness

Mechanical properties for Norjoist beams are given in Annex 2.

4.1.2 Creep and Duration of Load

Creep and Duration of load factors for Norjoist beams are given in Annex 2.

4.1.3 Dimensional Stability

Nominal dimensions and permissible deviations are given in Annex 3.

4.1.4 Seismic Evaluations

No performance determined.

4.2 Safety in case of Fire

4.2.1 Reaction to Fire

The joists consist of materials classified to have reaction to fire class D-s2, d2 according to table 8 of EN13986 using the classes defined in EN13501-1.

4.2.2 Resistance to Fire

No performance determined. (Performance in relation to resistance to fire would be determined for the complete structural element including any associated finishes).

4.3 Hygiene, Health and the Environment

4.3.1 Release of Dangerous Substances

Based on the declaration of the manufacturer, Norjoists do not contain harmful or dangerous substances as defined in the EU database, but this does not cover EPI (Emulsion Polymer Isocyanate) adhesives. Based on the evidence presented the PMDI adhesive known as WD3-A322/CX-47 and UX-100/WD3A322 by Ashland Chemicals complies with ASTM D2559 [8] and satisfies type 1 specification to BS EN 301. The product does not contain pentachlorophenol or formaldehyde.

Note:

In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

4.4 Safety in Use

Not Relevant

4.5 Protection against Noise

Not Relevant

4.6 Energy Economy and Heat Retention

4.6.1 Thermal Resistance

No performance determined.

4.7 General Aspects Related to the Performance of the Product

4.7.1 Manufacturing

The Norjoist I-Beams are manufactured in the factory in accordance with the provisions of this European Technical Approval as identified during inspection of the plant by BM TRADA.
Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to BM TRADA before the changes are introduced. BM TRADA will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

4.7.2 Installation

Refer to Annex 4 for installation instructions.

4.7.3 Durability

Norjoist beams can be used in service classes 1 and 2 according to Eurocode 5, and hazard classes 1 and 2 as specified in EN 335. The product may be exposed to the weather for a short time during installation.
The flange and web materials are untreated and so do not withstand attacks from fungi, although black spruce (Picea mariana) is classified as slightly durable according to EN 350-2. Durability may also be reduced by attack from insects such as Longhorn beetle, dry wood termites and Common furniture beetle (Anobium) in regions where these may be found.

4.7.4 Serviceability

Unacceptable deformation is addressed under 4.1.

4.7.5 Packaging, Transport and Storage

Norjoist I-Beams shall be protected against harmful wetting during transport and storage. The joists will arrive on site with a typical flange moisture content of 16%.
The beams must not be lifted or stored in such a way that bending around the weak axis may cause damage to the beams. On site the joists should be stacked on edge and stored out of ground contact.
Norjoist I-Beams shall be stored to minimize changes in moisture content, caused by the weather, by storing under cover but permit free passage of air.
They should be protected from excessive sun, rain or moisture. Site storage is intended to be temporary, prior to erection. The fabrication and delivery of joists should therefore be arranged to minimize the storage time, both at the fabricator's premises and on site.
Nordic Engineered Wood recommends that the joists be wrapped in protective plastic covering, for protection of the beams against short term exposure to inclement weather.
The Manufacturer must ensure that the information of these provisions is provided to all those concerned.
Beams damaged during storage or transport must be discarded. Only sound beams should be used/installed.

5 Assessment & Verification of Constancy of Performance

5.1 AVCP System

According to Decision 1999/792/EC of the European Commission[1], of 21/01/1999, the System(s) of Assessment and Verification of Constancy of Performance (see Annex V of Regulation (EU) No. 305/2011) given in Table 3 applies.

Table 3: System of Assessment and Verification of Constancy of Performance

Product	Intended Use	AVCP System
Light Composite Wood Based Beams for Structural Purposes	In Building Works	1

The System of Attestation and Verification of Constancy of Performance referred to above is defined as follows.

System 1: Certification of the Conformity of the product by a Notified Certification Body on the basis of:

a) **Tasks for the Manufacturer**

(1) Factory Production Control

(2) Further testing of samples taken from the factory in accordance with a prescribed test plan.

b) **Tasks for the Notified Body**

(3) Initial Type Testing of the product

(4) Initial inspection of Factory and of Factory Production Control

(5) Continuous surveillance, assessment and approval of factory production control

Note: *In addition to the above, the manufacturer shall make a Declaration of Performance (DoP) of the product.*

6 Technical Details necessary for the Implementation of the AVCP System, as foreseen in the applicable EAD

6.1 Tasks for the Manufacturer

6.1.1 Factory Production Control (FPC)

The manufacturer has a factory production control system (FPC) and exercises permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of policies, procedures and work instructions. This FPC system ensures that the product is in conformity with this European Technical Assessment.

The manufacturer shall only use raw materials or components that are supplied with the relevant inspection documents as laid down in the Control Plan[2]. All incoming raw materials shall be subject to inspection, verification, controls and tests (as applicable) by the manufacturer.

[1] Official Journal of the European Communities

[2] The Control Plan has been deposited at BM TRADA and is only made available to the Approved Bodies involved in the AVCP procedure.

The Control Plan which is part of the technical documentation of this European Technical Assessment includes details of the extent, nature and frequency of testing and controls to be performed within the FPC system and has been agreed between the approval holder and BM TRADA. Any changes to the FPC or the product shall only be made following approval by BM TRADA.

The results of FPC are recorded and evaluated. These records include but are not limited to:

- Product specification and designation, basic materials and components
- Type(s) of Control testing
- Date of manufacture of the product and date of testing of the product or basic material and components;
- Result of control and testing and, if appropriate, comparison with requirements;
- Signature of the person responsible for FPC

These records shall be presented to BM TRADA upon request.

6.2 Tasks of Notified Bodies

6.2.1 Initial Type Testing of the Product

Initial type testing has been undertaken under the responsibility of BM TRADA to verify that the production line in question is able to manufacture products in conformity with this ETA. The initial type testing has been limited to testing of the adhesive bonded connections between web and flanges and the shear resistance of the web. Whenever the board is changed, the shear resistance shall be verified by initial type testing.

Whenever a change occurs in materials or production process which would significantly change the above characteristics, the tests or assessments shall be repeated for the appropriate characteristics.

6.2.2 Initial Inspection of Factory and of Factory Production Control

The Notified Body shall ascertain that, in accordance with the Control Plan, the factory and the factory production control are suitable to ensure continuous and orderly manufacturing of the product according to the specifications mentioned in Section 2, as well as to the Annexes to this European Technical Assessment.

6.2.3 Continuous Surveillance

The Notified Body shall visit the each Production Unit / Factory twice a year for regular inspection. It shall be verified that the system of factory production control and the specified manufacturing process is maintained in accordance with this European Technical Assessment and the Control Plan.

Continuous surveillance and assessment of factory production control shall be performed according to the Control Plan.

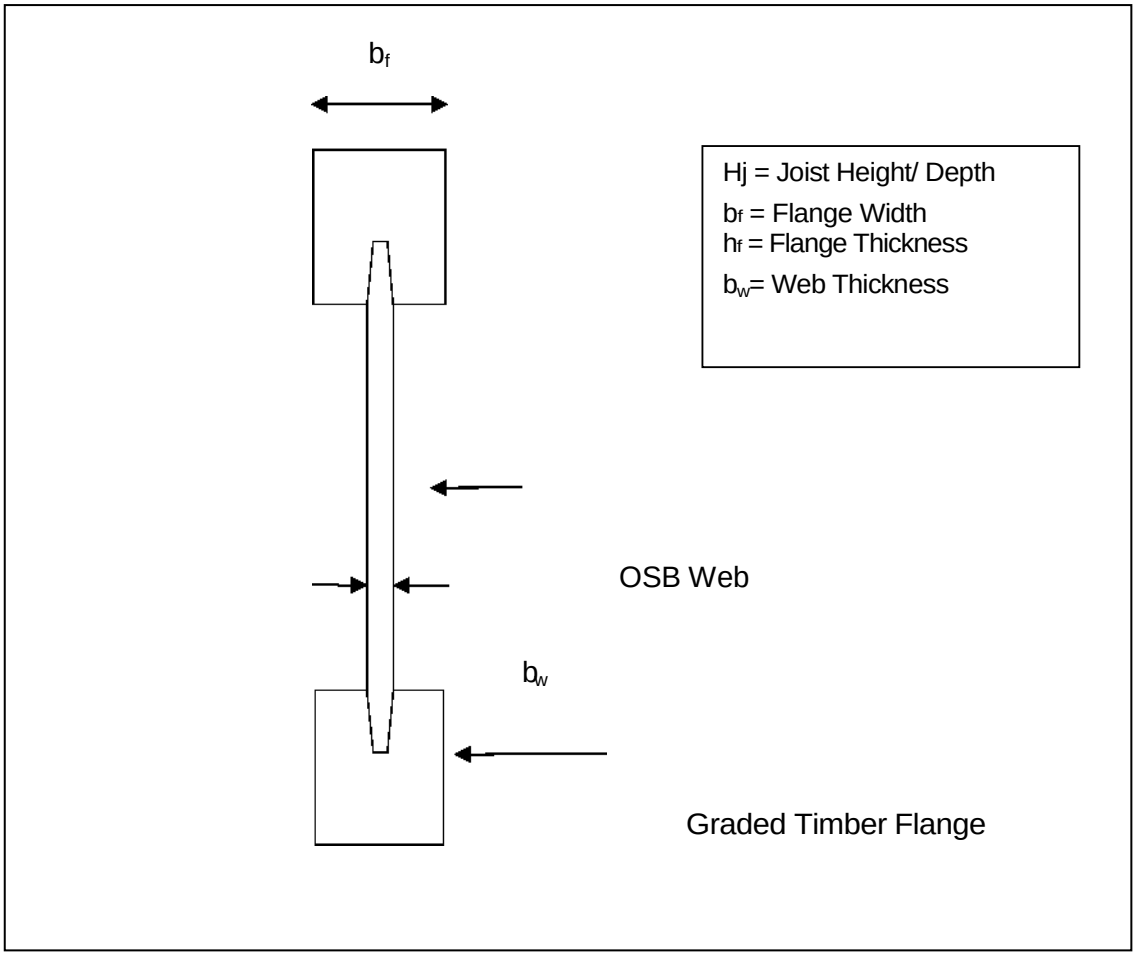
The results of product certification and continuous surveillance shall be made available on demand by the certification body or inspection body, respectively, to BM TRADA. In cases where the provisions of this European Technical Assessment and the prescribed test plan are no longer fulfilled, the conformity certificate shall be withdrawn.

Issued in High Wycombe, United Kingdom on dd/mm/yyyy by

Niresh D Somlie
Senior Technical Officer

7 ANNEX 1:

Cross Section of the Norjoist Beam



8 ANNEX 2

Table A2.1 Norjoist Product Range and Dimensions

Joist Designation	Joist Depth (mm)	Flange Dimensions h_f X b_f (mm)	Web Thickness B_W (mm)	Web Orientation	Joist Weight (Kgm^{-1})
$7^{7}/_{8}$ ″ NI-40x	200	38 × 63	9,5	Parallel	3,50
$7^{7}/_{8}$ ″ NI-60					3,79
$7^{7}/_{8}$ ″ NI-80		38 x 89			4,54
$8^{21}/_{32}$ ″ NI-40x	220	38 × 63	9,5	Parallel	3,65
$8^{21}/_{32}$ ″ NI-60					3,94
$8^{21}/_{32}$ ″ NI-80		38 x 89			4,69
9 1/4 ″ NI-20	235	38 × 63	9,5	Parallel	3,79
9 1/4 ″ NI-40x					3,88
9 1/4 ″ NI-80		38 x 89			4,69
9 1/2 ″ NI-20	241	38 × 63	9,5	Parallel	3,79
9 1/2 ″ NI-40					3,94
9 1/2 ″ NI-40x					3,94
9 1/2 ″ NI-60					4,14
9 1/2 ″ NI-80		38 x 89			4,87
11 1/4 ″ NI-20	286	38 × 63	9,5	Parallel	4,09
11 1/4 ″ NI-40x					4,18
11 1/4 ″ NI-80		38 x 89			5,04
$11^{7}/_{8}$ ″ NI-20	302	38 × 63	9,5	Parallel	4,24
$11^{7}/_{8}$ ″ NI-40					4,24
$11^{7}/_{8}$ ″ NI-40x					4,24
$11^{7}/_{8}$ ″ NI-60					4,45
$11^{7}/_{8}$ ″ NI-80		38 x 89			5,13
14 ″ NI-40	356	38 × 63	9,5	Perpendicular	4,46
14 ″ NI-40x					4,46
14 ″ NI-60					4,69
14 ″ NI-80		38 x 89			5,58
16 ″ NI-40	406	38 × 63	9,5	Perpendicular	4,91
16 ″ NI-40x					4,91
16 ″ NI-60					5,15
16 ″ NI-80		38 x 89			5,88

Table A2.2: Characteristic Strength, Modulus of Elasticity and Rigidity Values for Joist Flanges to be used in Calculations

Joist Series		NI-20	NI-40	NI-40x	NI-60	NI-80
Bending Strength – Parallel to Grain (N/mm^2)	$f_{m,k}$	12.67	23.89	26.06	30.41	30.41
Tensile Strength – Parallel to Grain (N/mm^2)	$f_{,t,k}$	15.56	16.51	17.37	22.80	22.80
Compression Strength – parallel to Grain (N/mm^2)	$f_{,c,k}$	15.07	22.27	22.93	24.56	24.56
Shear Strength – Parallel to Grain (N/mm^2)	$f_{,v,k}$	1.95	1.95	1.95	2.32	2.32
Bending Stiffness – Parallel to Grain – Mean (N/mm^2)	E_{mean}	8274	10687	11997	12755	12755
Bending Stiffness – Parallel to Grain – Min (N/mm^2)	$E_{0.05}$	4871	8753	9826	10447	10447

It should be noted that Norjoist upgrade their timber strength values above and beyond that specified in APA documentation through In-house QA testing. It is recommended that when carrying out CE Surveillance Audits the auditor should make note to check the in-house QA data to ensure that the characteristic strength achieved during testing is equal to or above that quoted in Table A2.1.

Table A2.3: Web Properties for all Joist Series

For All Joist Series		
Axial Tensile Strength Parallel to the Manufacturing Direction (N/mm^2)	$f_{t,0,k}$	7.40
Axial Compression Strength Parallel to the Manufacturing Direction N/mm^2	$f_{c,0,k}$	8.29
Axial Tensile Strength Perpendicular to the Manufacturing Direction (N/mm^2)	$f_{t,90,k}$	2.50
Axial Compression Perpendicular to the Manufacturing Direction (N/mm^2)	$f_{c,90,k}$	7.28
Panel Shear Strength (N/mm^2)	f_v	5.98
Panel Shear Stiffness (N/mm^2)	G_v	1425
Axial Stiffness(In Tension or Compression) Parallel to the Manufacturing Direction (N/mm^2)	$E_{axial,0,k}$	5233
Axial Stiffness (in Tension or Compression) Perpendicular to the Manufacturing Direction (N/mm^2)	$E_{axial,90,k}$	3830

9 ANNEX 3

Table A3.1: Characteristic Strength and Stiffness Properties together with Weight per Metre Length

Joist Designation	Depth (mm)	Bending Moment Capacity M (kNm)	Bending stiffness capacity EI (10^{12} Nmm ^{2})	Shear Strength Capacity V (kN)	Shear Stiffness Capacity GA (10^6 N)	Intermediate Reaction Capacity(1) IR (kN)	End Reaction Capacity(2) ER (kN)	Weight Per Metre Length (kg/m)
7 % NI-40x	200	6,58	0,387	9,28	1,991	19,92	9,28	3,50
7 % NI-60		8,64	0,410	9,28	1,991	19,92	9,28	3,79
7 % NI-80		12,21	0,575	9,28	1,991	19,92	9,28	4,54
8 5/8 NI-40x	220	7,39	0,487	10,33	2,263	19,92	9,28	3,65
8 5/8 NI-60		9,70	0,5 17	10,33	2,263	19,92	9,28	3,94
8 5/8 NI-80		13,71	0,725	10,33	2,263	19,92	9,28	4,69
9 1/4 NI-20	235	6,79	0,399	11,39	2,470	17,92	9,49	3,79
9 1/4 NI-40x		7,99	0,571	12,33	2,466	21,07	10,54	3,88
9 1/4 NI-80		14,83	0,848	12,33	2,466	23,61	11,81	4,69
9 1/2 NI-20	241	7,01	0,426	11,81	2,556	17,92	9,49	3,79
9 1/2 NI-40		7,84	0,543	11,81	2,552	21,07	10,54	3,94
9 1/2 NI-40x		8,25	0,609	12,65	2,552	23,61	11,81	3,94
9 1/2 NI-60		10,83	0,646	12,65	2,552	23,61	11,81	4,14
9 1/2 NI-80		15,31	0,904	12,65	2,552	25,09	12,55	4,87
11 1/4 NI-20	286	8,54	0,638	14,13	3,160	18,98	9,49	4,09
11 1/4 NI-40x		10,04	0,907	14,86	3,155	28,99	13,18	4,18
11 1/4 NI-80		18,65	1,344	14,86	3,155	27,12	14,02	5,04
11 % NI-20	302	9,08	0,724	14,97	3,375	18,98	9,49	4,24
11 % NI-40		10,15	0,919	14,97	3,371	25,25	12,12	4,24
11 % NI-40x		10,68	1,029	15,60	3,371	28,99	13,18	4,24
11 % NI-60		14,02	1,091	15,60	3,371	28,99	13,18	4,45
11 % NI-80		19,84	1,523	15,60	3,371	30,57	14,02	5,13
14 NI-40x	356	12,86	1,506	17,81	4,104	28,99	13,18	4,46
14 NI-60		16,88	1,595	17,81	4,104	28,99	13,18	4,69
14 NI-80		23,89	2,221	18,24	4,104	32,09	14,02	5,58
16 NI-40x	406	14,91	2,043	17,28	4,794	28,99	13,18	4,91
16 NI-60		19,58	2,163	17,28	4,794	28,99	13,18	5,15
16 NI-80		27,70	3,004	20,77	4,794	34,89	14,02	5,88

1) The bearing capacities given are for a minimum bearing length of 89mm
2) The bearing capacities given are for a minimum bearing length of 44mm

Table A3.2: Values of kmod for Norjoist Beams

Duration of Load	Bending and Axial Resistance		Shear Resistance	Bearing Resistance
	Service Class 1	*Service Class 2*	*Service Class 1 & 2*	*Service Class 1 & 2*
Permanent	0,60	0,60	0,30	0,30
Long Term	0,70	0,70	0,40	0,40
Medium Term	0,80	0,80	0,55	0,55
Short Term	0,90	0,90	0,70	0,70
Instantaneous	1,10	1,10	0,90	0,90

Table A2.3: Values of kdef for Norjoist Beams

Bending and Axial Deformation		Shear Deformation
Service Class 1	*Service Class 2*	*Service Class 1 & 2*
0,60	**0,80**	**2,25**

10 ANNEX 4

Norjoist beams are manufactured following documented quality control systems. Quality control procedures include checks on web, flange and adhesive materials for specification and moisture content, dimensional checks before and after preparation, verification of adhesive spread, fit of component parts and curing temperature.

Manufacturing tolerances are given in Table A3.1. Regular tests are undertaken to monitor adhesive bond on the web-flange connections, shear strength and the strength of completed joists

Table A3.1: Manufacturing Tolerances

Member Dimensions	Manufactured Tolerance (mm)*
Overall Joist Length (mm)	±12,5(1)
Overall Joist Height	−3,2 + 0,0
Flange Thickness	−1,6
Flange Width	±0,8
Web Thickness (for OSB)	±0,8

* At Manufacturing Moisture Content

(1) Depending on length.

11 ANNEX 5: Installation Instructions

The technical manual of the manufacturer shall be followed; current examples of details are given below. The following points are especially critical.

1. Norjoists shall be installed on the basis of a specific structural design for each installation, using the load-bearing capacities given in Annex 2 of this ETA.
2. Actions at joist supports shall not exceed the bearing resistance given in Annex 2.
3. The joists shall be installed by appropriately qualified personnel, following an installation plan and relevant construction details worked out for each individual building project. The installation plan shall be based on the manufacturer's general guide and provisions for installing Norjoists.
4. Temporary bracing should be used to keep the Norjoists in a straight and plumb position during installation and to avoid instability. I-joists should be handled similar to solid timber beams, except that their strength and stiffness is less around their minor axis. Hence care must be taken to ensure that joists are not damaged during handling due to bending around this axis.
5. Flooring is to be fixed to the top flange of the joists. The maximum spacing between fixings should be 400mm.
6. The flanges must not be drilled, notched or material otherwise removed on site.
7. Significantly damaged I-joists should not be used.
8. In common with similar timber based products, it is recommended that eye protection and dust masks be used when cutting.
9. Rigid service pipes can be incorporated within the floor or roof void, by passing through the perforated knockout holes in the Norjoists.
10. The manufacturer shall ensure that the information of these provisions is given to those concerned.