



BRANZ Appraised

Appraisal No.841 [2014]

BRANZ Appraisals

Technical Assessments of products
for building and construction

**BRANZ
APPRAISAL
No. 841 (2014)**

TRAY-DEC FLOORING SYSTEM

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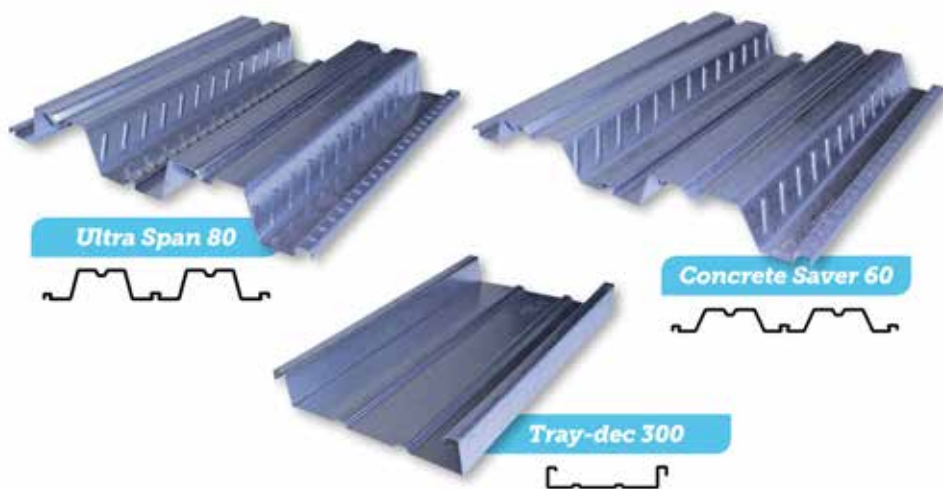


Product

1.1 The Tray-dec Flooring System comprises Ultra-Span 80, Concrete Saver 60 and Tray-dec 300 which are roll-formed, interlocking galvanised steel trays used as permanent formwork for composite reinforced concrete floor slabs.



Tray-dec NZ Ltd



Scope

2.1 The Tray-dec Flooring System is a permanent steel formwork, reinforced concrete floor system for use in buildings subject to specific engineering design.

2.2 The Tray-dec Flooring System has been appraised for use in dry internal environments.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, the Tray-dec Flooring System if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet or contribute to meeting the following provisions of the NZBC:

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. The Tray-dec Flooring System meets the requirements for loads arising from self-weight, imposed gravity loads arising from use, earthquake, wind and time dependent effects including creep and shrinkage [i.e. B1.3.3 (a), (b), (f), (h) and (q)]. See Paragraphs 8.1 – 8.2.

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years. The Tray-dec Flooring System meets this requirement. See Paragraphs 9.1 – 9.4.

Clause C3 FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE: Performance C3.4 and C3.6. The Tray-dec Flooring System meets or contributes to meeting these requirements. See Paragraphs 11.1 – 11.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The Tray-dec Flooring System meets this requirement and will not present a health hazard to people.

3.2 This is an Appraisal of an **Alternative Solution** in terms of New Zealand Building Code compliance.

Technical Specification

Tray-dec Trays

4.1 The Tray-dec Flooring System is a composite steel flooring incorporating interlocking steel trays as permanent formwork and conventional reinforced concrete. The three Tray-dec profiles are as follows:

Ultra-Span 80

4.2 Steel trays roll-formed from G500 and G520, Z275 steel coil that is either 1.2 mm or 0.95 mm thick. The trays are nominally 80 mm deep and 621 mm wide and overlap the tray next to them on installation such that they are placed at a pitch of 600 mm. Concrete slab depths measured from the bottom of the steel form vary from 130 mm to 265 mm.

Concrete Saver 60

4.3 Steel trays roll-formed from G520 and G550, Z275 steel coil that is either 0.95 mm or 0.75 mm thick. The trays are nominally 60 mm deep and 621 mm wide and overlap the tray next to them on installation such that they are placed at a pitch of 600 mm. Concrete slab depths measured from the bottom of the steel form vary from 110 mm to 200 mm.

Tray-dec 300

4.4 Steel trays roll-formed from G520 and G550, Z275 steel coil that is either 0.95 mm or 0.75 mm thick. The trays are nominally 56 mm deep and 330 mm wide and overlap the tray next to them on installation such that they are placed at a pitch of 305 mm. Concrete slab depths measured from the bottom of the steel form vary from 100 mm to 200 mm.

Accessories

4.5 Accessories and materials used with the Tray-dec Flooring System that are supplied by Tray-dec NZ Ltd are:

- Edge forms – manufactured from the same steel as the Tray-dec steel trays and custom manufactured on a job-by-job basis to take account of different slab thicknesses that are used.
- Restraint straps – manufactured from the same steel as the Tray-dec steel trays and used as lateral restraint for the edge forms as the concrete is being placed.
- Plastic end caps – for use with Ultra-Span 80 and Concrete Saver 60. These provide formwork at the ends of trays to prevent concrete leaking out when it is placed.

4.6 Components used with the Tray-dec Flooring System that are supplied by others are:

- Concrete – Minimum 30 MPa 28 day compressive strength standard weight concrete, nominally 2,350 kg/m³, supplied from a ready mixed concrete plant holding certification under the New Zealand Ready Mixed Concrete Association Plant Classification Scheme.
- Reinforcing steel and mesh – Complying with NZS 3101 and the specific engineering design for the installation.

Packaging, Handling and Storage

5.1 Tray-dec trays that are stored on site must be stacked clear of the ground with a fall for drainage and protected by waterproof covers that leave space between cover and trays to allow free circulation of air.

5.2 Other components must also be stored in covered, dry locations, clear of the ground.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the Tray-dec Flooring System. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, installation, use and maintenance contained within the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

General

7.1 The Tray-dec Flooring System Technical Literature contains design information and procedures required to allow building designers to design structures incorporating the Tray-dec Flooring System.

Structure

General

8.1 The Tray-dec Flooring System is for use within concrete framed structures that have been designed in accordance with NZS 3101 and/or steel framed structures that have been designed in accordance with NZS 3404. Tray-dec Floors may also be supported by masonry walls designed in accordance with NZS 4230.

Design

8.2 Design of the Tray-dec Flooring System must be in accordance with the information and methods given in the Technical Literature or by using the Tray-dec design software, and must be carried out by a suitably qualified design engineer considering all loading types as specified in Paragraph 3.1.

Durability

9.1 The Tray-dec Flooring System is expected to have a serviceable life of at least 50 years when installed in dry, benign environments.

9.2 Where the underside of Tray-dec floors will be in the presence of vapours that may attack galvanised steel components during service then Tray-dec NZ Ltd should be contacted to determine the correct panel coating is used to ensure the required service life of the system is achieved. This aspect of design has not been assessed and is outside the scope of this Appraisal.

9.3 Consideration must be given at design stage to ensure that the metal trays of the Tray-dec Flooring System do not come into contact with dissimilar metals that may cause corrosion. Internal conditions must be maintained such that condensation cannot form on the steelwork.

9.4 Where the concrete surface of the Tray-dec Floors may encounter deleterious substances then the concrete material properties and the cover to the reinforcing steel should be in accordance with the requirements of NZS 3101 or additional coatings should be used. These aspects of design have not been assessed and are outside the scope of this Appraisal.

Maintenance

10.1 Where the underside of the Tray-dec Flooring System is exposed an inspection should be carried out at least annually to ensure that no undue degradation is occurring. Where items such as corrosion are identified, then the cause must be determined, and repairs must be made to restore the system.

10.2 Where the underside is not exposed then no maintenance should be required.

Fire Affecting Areas Beyond the Fire Source

11.1 The components of the Tray-dec Flooring System, being galvanised steel and reinforced concrete, are considered to be non-combustible. As such they can be assigned a Group Number of 1 or 1-S.

11.2 Ultra-Span 80 floors with a slab depth of at least 140 mm, Concrete Saver 60 floors with a slab depth of at least 120 mm, and Tray-dec 300 floors are capable of providing a fire resistance rating of at least 30/30/30. All design aspects relating to fire must be subject to specific engineering design.

Installation Information

Installation Skill Level Requirement

12.1 Tray-dec Flooring System must only be installed by Tray-dec installation personnel or a Licensed Building Practitioner (LBP). Where an LBP does not have previous experience with the installation of Tray-dec Flooring System, Tray-dec installation personnel will assist with instruction in the correct procedures and where necessary will assist on site until they are satisfied that the LBP is sufficiently competent to correctly install the Tray-dec Flooring System.

General

13.1 The Tray-dec Flooring System must be installed in accordance with the specification contained in the Technical Literature and the instructions of the design engineer. This includes aspects such as end support for trays, temporary propping requirements and installation of any shear studs and the required concrete reinforcement.

Inspections

13.2 For inspection, reference must be made to the specific building design documentation and the Technical Literature.

Health and Safety

13.3 Temporary propping is considered as scaffolding and must be treated accordingly.

13.4 When wet concrete is being placed it is alkali, and suitable precautions should be taken to protect workers as alkali burns to the skin are a risk.

13.5 Where powder-actuated fasteners are used OSH guidelines on the use of powder-actuated hand-held fastening tools must be followed.

Structural Frame

13.6 The structure and/or structural frame to which the Tray-dec Flooring System will be attached must be constructed to the designer's specifications.

Fixing

13.7 The fixing of the Tray-dec trays and reinforcing steel and placing of the concrete must be strictly in accordance with the Technical Literature and the instructions of the design engineer.

13.8 Where shear connectors are used these must be installed in accordance with the requirements of NZS 3404.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

14.1 A fire test has been carried out to determine the performance of the Tray-dec Flooring System under fire conditions. The results have been reviewed by BRANZ and used as a basis of the structural and fire assessment.

Other Investigations

15.1 An engineering assessment of the basis of the Tray-dec Flooring System Technical Literature and design software has been carried out by BRANZ and found to be satisfactory.

15.2 An assessment was made of the durability of the systems by BRANZ technical experts and found to be satisfactory.

Quality

16.1 Tray-dec NZ Ltd's manufacturing process and details of the quality and composition of the materials have been examined by BRANZ and found to be satisfactory.

16.2 Tray-dec NZ Ltd is responsible for the quality of the product supplied.

16.3 Quality on site is the responsibility of the Tray-dec NZ Ltd approved installer and/or the building contractor.

16.4 Designers are responsible for incorporating the Tray-dec Flooring System into the design of their buildings.

16.5 Building owners are responsible for the maintenance of the Tray-dec Flooring System in accordance with the instructions of Tray-dec NZ Ltd.

Sources of Information

- BS 5950-8:2003 Structural use of steelwork in building – Code of practice for fire resistant design.
- NZS 3101.1 & 2:2006 Concrete structures standard.
- NZS 3404.1 & 2:1997 Steel structures standard.
- NZS 4230: 2004 Design of reinforced concrete masonry structures.
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.



BRANZ

In the opinion of BRANZ, **Tray-dec Flooring System** are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Tray-dec NZ Ltd**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
 - a) relates only to the product as described herein;
 - b) must be read, considered and used in full together with the technical literature;
 - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
 - d) is copyright of BRANZ.
2. **Tray-dec NZ Ltd**:
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions.
 - d) Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by **Tray-dec NZ Ltd**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **Tray-dec NZ Ltd** or any third party.

For BRANZ

C Percy
Chief Executive

Date of issue: 11 December 2014