

# ETABS v22.4.0 Release Notes

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**Notice Date: 20-December-2024**

This document lists changes made to ETABS since v22.3.0, released 18-October-2024. Items marked with an asterisk (\*) in the first column are more significant.

## Analysis

### Enhancements Implemented

*	Ticket	Description
*	10976	The rotation of link-element local axes with large displacements is now controlled by the P-delta factors defined for the link property. This new behavior only affects nonlinear static, direct-integration, and staged-construction load cases where the geometric nonlinearity parameter has been set to "P-Delta plus Large Displacements". Previously the local-1 axis was always oriented along the deflected line from joint I to joint J. Now the local-1 axis can be specified as determined by the rotation at joint I, the rotation at joint J, the deflected line from joint I to J, or a linear combination of these, all in direct proportion to the specified P-delta factors for the moment at end I, the moment at end J, and the shear-force couple, respectively. The behavior is specified separately for the local 1-2 and local 1-3 planes as part of the link-property definition. While the use of the deflected line is appropriate for braces and truss-like members, the use of end rotations rather than the deflected line is better for gap elements, as well as for certain devices (like friction isolators), where the axial behavior does not change with shear deflection. Note that for zero-length elements, only the joint rotations are used. For one-joint links, the rotation at joint I is assumed to be zero. Previously no large-displacement effect was considered for zero-length or one-joint links. For all links, the local-2 and local-3 axes rotate about the local-1 axis with the average torsional rotation of the two ends, which was the previous behavior as well.

## API

### Enhancements Implemented

*	Ticket	Description
	1110	An enhancement has been made to add the API functions Export and Import the model text file (.e2k) and Database Tables in Excel, Access, Text File, and CHM File.

## Data Files

### Enhancements Implemented

*	Ticket	Description
	11111	An enhancement has been implemented to update the material library for New Zealand region. Previously, the materials from Australian standards that are commonly used in New Zealand had to be imported separately from the material library for Australian region. This enhancement updates the library for New Zealand region so that all requisite materials from the Australian standards are included in the New Zealand material library in addition to all materials per the New Zealand standards.

## Database Tables

### Enhancements Implemented

*	Ticket	Description
	10947	An enhancement has been implemented to add a database table to display the decision parameters (EI modifiers, EA modifiers, etc.) for steel frame design using Direct Analysis method. This table is only available if the steel frame design is carried out using AISC 360-22, AISC 360-16, AISC 360-10, AISC 360-05, KBC 2009, or KBC 2016 codes that offer Direct Analysis method.

**Design – Concrete Frame**  
**Enhancements Implemented**

*	Ticket	Description
	8077	An enhancement was made to ACI 318-19 and AS 3600-2018 concrete frame design codes where additional parameters are now reported for column slenderness design. For ACI 318-19 code, these parameters are beta_dns, (EI)eff and Pc. For AS 3600-2018 code, these parameters are beta_d, phi*Mub and Pc.

**Design – Shear Wall**  
**Enhancements Implemented**

*	Ticket	Description
*	1305	An enhancement was added to add slenderness check for wall buckling in the out-of-plane direction for ACI 318-19 design code. This check is only performed for wall in a single plane (i.e. 2D-pier) for uniform and General reinforcing options.
	11027	An enhancement was added for ACI 318-19 shear wall design where Seismic Design Category (SDC) is now accounted for in determining whether wall shear capacity check is needed or not. Previously, the capacity design requirement was solely determined based on Wall type.

**Design – Steel Frame**  
**Enhancements Implemented**

*	Ticket	Description
*	10823	An enhancement to composite beam design per Eurocode 4 was implemented. ETABS can now design beams with large web openings per the provisions of SCI Publication 355 and of Eurocode 3 - Design of Steel Structures - Part 1-13. This includes beams with a regular I-section and discrete openings as well as castellated and cellular beams.
	10948	An enhancement has been made to steel frame design codes "AISC 360-22", "AISC 360-16", "AISC 360-10", and "AISC360-05/IBC2006" in which the program now allows the sway effective length factors (K2 factors) to be less than 1. Previously, K2 factors were not allowed to be less than one, as this is the limit for all frame structures. However, for truss chords, the K2 can be less than 1. This change can affect the axial capacity of the members. K2 affects axial capacity calculation, and K1 affects the B1 factor calculation. Also, the other affected codes are "AS 4100:2020", "AS 4100-1998", and "NZS 3404-1997," where the factor is named as "ke Major/Minor Sway." The previous implementation was conservative for truss elements.
	10950	An enhancement has been made to steel frame design codes "EN 1993-1-1:2005/A1:2014", "Italian NTC 2018", and "Italian NTC 2008", in which the program now allows the fillet radius for web and flange connections for I-shapes, Channels, and Double Channels to be less than the flange plate thickness. The change affects the b/t ratio and might affect the moment capacities. The previous implementation was slightly unconservative when the specified fillet radius was less than the flange plate thickness.

**Drafting and Editing**  
**Enhancements Implemented**

*	Ticket	Description
	10979	An incident has been resolved to hide objects available only in Ultimate level of the program (i.e. tendons, design strips, slab panels, support lines, etc.) when a model created in Ultimate level is opened in a lower level of the program.

**Installation and Licensing**  
**Enhancements Implemented**

*	Ticket	Description
*	10927	The version number has been changed to 22.4.0 for a new intermediate release.

## Loading

### ***Enhancements Implemented***

<b>*</b>	<b>Ticket</b>	<b>Description</b>
	11089	An informative warning message will be shown when Tendons are present in a model with one or more inactive translational degrees of freedom (Analyze menu>Set Active Degrees of Freedom). Applying Tendon loads to inactive degrees of freedom may cause incorrect results.

## Results Display and Output

### ***Enhancements Implemented***

<b>*</b>	<b>Ticket</b>	<b>Description</b>
	10615	An enhancement was added to improve the display of pier shear design for Eurocode 2 shear wall design. This improvement includes the reporting of additional design parameters such as amplified shear ( $V_u$ , amplified) for seismic pier, pier shear capacity ( $V_{rd}$ ) and pier maximum allowable shear ( $V_{rdc,max}$ ). Display of wall failure message was also improved to display the correct shear design combo when failure occurred.

## Structural Model

### ***Enhancements Implemented***

<b>*</b>	<b>Ticket</b>	<b>Description</b>
	11023	An enhancement has been implemented to allow users to specify the hysteresis type for the "Buckling Restrained Brace" auto hinge type when assigning hinges to frame object(s). Previously, hysteresis type could not be specified for this auto hinge type.
	11074	An enhancement was done where dividing a curved frame (circular arc with 3 points) is now divided into circular curves instead of straight segments.
	11114	The Auto Hinge Assignment Data form (Assign menu>Frame>Hinges) has been improved for the auto hinge type "ASCE 41-13 with EC8 2005, Part 3 Acceptance Criteria" so that User Value shear values can be defined for concrete beam and concrete column type auto hinges to be used in the calculation for the EC8 2005, Part 3 acceptance criteria.

**Analysis  
Incidents Resolved**

<b>*</b>	<b>Ticket</b>	<b>Description</b>
*	10954	An incident was resolved where using the Multi-threaded solver on systems with AMD CPU's could lead to analysis errors, convergence failures, or incorrect results. The problem was dependent on the specific model being analyzed and was easily noticeable when this happened. This error did not affect the Advanced or the Standard solvers, and it did not affect machines using Intel CPU's. Note that the default solver is Advanced.
	11091	An incident was resolved where the forces and/or stresses reported in frame and shell objects did not include the internal forces or stresses due to loads applied to that element in linear direct-integration time-history load cases. For these same load cases, section cuts did not include loads applied directly to the elements that were cut, although loads carried by these elements from the rest of the structure were included. This did not affect the overall structural response or any other reported response quantities, only the reported response for element loading on the element itself and containing section cuts. Joint reactions and base reactions were not affected. This did not affect nonlinear static, staged-construction, or nonlinear direct-integration time-history load cases; it did not affect linear static or linear static multi-step load cases; it did not affect linear or nonlinear (FNA) modal time-history load cases.

**Database Tables  
Incidents Resolved**

<b>*</b>	<b>Ticket</b>	<b>Description</b>
	10914	An incident was resolved where Vertical Shear Wall hinges with Auto Fiber P-M3 assignments were not listed in the "Area Assignments - Wall Hinge - Vertical Shear Wall" database table. The hinge assignments are correctly reflected in the "Shell Assignment - Hinges" form (Assign menu>Shell>Wall Hinge) and the Wall object right-click menu. This issue did not affect the analysis results.
	10944	An incident has been resolved where database tables were not being generated for the steady state and power spectral density functions if the functions were read from file. Also, fixed the issue where attempting to interactively edit these tables would result in an abnormal termination of the program.
	10968	An incident has been resolved where editing the section cut definitions interactively after the analysis has been run would cause the analysis results to become unavailable. This also happened with other database tables that were available for interactive editing after the analysis had been run and the model was in locked state.
	11025	An incident was resolved where "Steel Frame Design Summary" table was incomplete when axial tension was governing for a specific design combination. This was a display issue in the table only and no design results were affected.
	11071	An incident was resolved where Table - Joint Design Summary was not filled when there was no beam in the major direction.
	11077	An incident was resolved where the user may receive an error when modifying the "Area Assignments - Wall Hinge Reinforcement" table using the interactive database (Edit menu>Interactive Database) for a wall hinge reinforcement assignment of the Specified Rebar Layout type with a zero start or end zone size. Setting a zero start and end zone size is allowed in the Wall Hinge Reinforcement form (Assign menu>Shell>Reinforcement for Wall Hinge) and the database table import function has been improved to allow that option.

**Design – Composite Beam**  
**Incidents Resolved**

* Ticket	Description
11093	An incident has been resolved for the Eurocode 4-2004 composite column design in which the effective modulus of elasticity of concrete accounting for long-term effects was calculated to be negative. This was due to the situation with the load combination that has total normal force and permanent part of it having opposite signs. Now, the effective modulus of elasticity of concrete will be taken as the secant modulus for such situation or when the column is in tension.

**Design – Concrete Frame**  
**Incidents Resolved**

* Ticket	Description
10924	An incident has been resolved for the Eurocode 2-2004 concrete frame design for crack width. Previously, an error message was incorrectly produced for the situation where axial tension demand exceeds capacity when the design iteration with low amount of reinforcement was performed. Now, it is correctly checked after all the required design iterations are done.
11014	An incident was resolved for ACI 318-19 concrete column design where Sway Special and Sway Intermediate design was including the additional shear due to gravity loading in a particular combination in addition to capacity shear. The contribution of gravity loading was not required to be added in the capacity shear for columns. It is added for beam design.

**Design – Shear Wall**  
**Incidents Resolved**

* Ticket	Description
10907	An incident was resolved for ACI 318-19 shear wall design where program was using SDC category = B for non-seismic design and SDC category = D for seismic design. The SDC category specified by user was being changed to these values after the design was completed. The program now uses the SDC category specified by the user.
10923	An incident was resolved where Wall Ductility Type label (i.e. "DC High", "DC Medium", ...) was not correctly initialized when wall design code was switched to Eurocode 2. This issue was only present in v22.

**Design – Steel Frame**  
**Incidents Resolved**

* Ticket	Description
10995	An incident has been resolved in the Chinese steel frame design code "Chinese 2018," in which the program now uses the negative sign instead of a positive sign in the interaction equation "GB50017 8.2.1-4." The previous implementation of the code was overly conservative.
11070	An incident was resolved for Chinese 2010 and Chinese 2018 steel frame design codes where Dual System SMF overwrite was not applied. The Dual System SMF is not applicable for "Frame Only", "Shearwall Only" and "Steel Frame" systems.

**Detailing**  
**Incidents Resolved**

* Ticket	Description
10843	An incident was resolved where drawing manager drawing scaling was not correct when database units were as 'm', 'cm' or 'ft'. It was correct when database units were the usual 'mm' or 'inch'.
11085	An incident was resolved where in the 'Pier Rebar Rules' dialog box's 'Vertical - Unconfined Zone' the maximum rebar spacing was not being filled correctly.

**Documentation**  
**Incidents Resolved**

*	Ticket	Description
	7766	Help document has been updated for Snap option.

**Graphics**  
**Incidents Resolved**

*	Ticket	Description
*	10940	An incident was resolved where AVI creation was crashing the program. There are two options now available to create movies i.e. AVI and MPEG format. No compression is performed for AVI format,
	11067	An incident was resolved where 3D curved wall data could have been corrupted so that it would not appear correct in 3D views. This issue only occurred when curved walls were replicated to other stories.

**Results Display and Output**  
**Incidents Resolved**

*	Ticket	Description
	10867	An issue has been resolved in the steel frame design codes "AISC 360-22," "AISC 360-16," and "AISC 360-10," where the program incorrectly reported forces during special checks for custom combo forces within combinations due to an initialization error. While the stress ratios are correct, the shear force was reported as zero. It was a reporting-only problem.
	10902	An incident was resolved where some frame objects orientations were not drawn correct in deformed shape extruded view.
	10943	An incident affecting the export of composite beam design preferences to database tables was resolved. Composite beam design preferences for the CSA S16-14 and CSA S16-19 codes were not exported. This incident affected ETABS v22.2.0 and v22.3.0. When it occurred, the error was obvious and results were unaffected.
	11021	An incident was resolved for ACI 318-19 shear wall design where flexural design governing combination name was not correctly reported in the pier design report. This was just a reporting issue and design results were not affected.
	11040	An incident was resolved for ACI 318-19, ACI 318-14 and ACI 318-11 concrete frame design report where $\phi v_{max}$ in the column "Shear Details" tab was not reported. This was just a reporting issue and no design results were affected.
	11051	An incident was resolved where the program was not able to create a report for wind loading in certain cases.
	11060	An incident has been resolved where, sometimes, the program would crash when selecting tables for export on the database table form with the Expose All Input Tables check box checked. This issue was seen only when exporting data for very large models.

**Structural Model**  
**Incidents Resolved**

*	Ticket	Description
	10993	An incident has been resolved where interactive editing of any table would result in the message "Error occurred attempting to apply changes to model!" if the table(s) were interactively edited after defining one or more point, line, and/or area spring property.
	11066	An incident was resolved where Auto Fiber P-M3 Hinges assigned to Wall Objects that had a Specified Rebar Layout type of Wall Reinforcement assignment (Assign menu > Shell > Reinforcement for Wall Hinge) may use an incorrect backbone curve for the concrete material in the start and end zone regions if these regions were specified as confined. When this issue occurred, the backbone curve used by the program is shown in the individual fiber results plot (Display menu > Hinge Results). This issue only affected ETABS v22.1.0-22.3.0. Rerunning affected models in ETABS v22.4.0 will resolve the issue.

*	Ticket	Description
	11087	An incident has been resolved that fixes an incorrect message generated in the program when deleting a spandrel label that was assigned in the model. The message was incorrectly stating that a pier was being deleted instead of referring to the spandrel being deleted. Also, the label mentioned in the message was for a pier instead of the spandrel in question.
	11110	An incident was resolved where the acceptance criteria values for Concrete Column M2-M3 and P-M2-M3 auto-hinges of the type "ASCE41-13 with EC8 2005, Part 3 Acceptance Criteria" did not calculate different LS and CP acceptance criteria values for rectangular sections. This has been corrected so that the EC8 acceptance criteria values reflect the depth and width of the frame section for the angle that each moment-rotation curve is generated for.

## User Interface

### *Incidents Resolved*

*	Ticket	Description
	10897	An incident was resolved where Terrain Category was not saved for TCVN 2737:2023 auto wind load pattern.
	10919	An incident was resolved where the right click form for point object was ignoring the mass assigned to a joint for a given degree of freedom if the assigned mass was negative. Because of this, the form showed that no mass was assigned to the point object. However, expanding the mass node on the form did show the negative mass assignments. This was just a display issue and did not affect the analysis results in any way.
	10932	Several issues related to punching shear overwrites tables and interactive editing have been resolved as follows: 1) The table for punching shear opening overwrites could not be generated. Also, attempting to interactively edit the same table would result in an abnormal termination. 2) "Selection Only" option was not working for displaying and interactively editing tables. 3) Area objects with same unique name as the joints were getting selected instead of point objects when selection command from the table was used to select point objects that had punching shear overwrites assigned.
	10969	An incident has been resolved where the auto construction sequence load case(s) were not available in the list of load cases for selection when requesting tabular output of analysis results. As a result, the tabular output of results could not be generated for auto construction sequence load case(s).