



Construction Plant-hire Association Tower Crane Interest Group



Tower Crane Technical Information Note

TIN 031

Tower Crane Bases and Ties

This Technical Information Note specifies arrangements for the design of tower crane bases and ties, checking of designs and conformation of correct installation and/or construction.

1. Tower Crane Bases

The appointed person planning the erection, alteration, climbing or dismantling of a tower crane must ensure that the tower crane base, of whatever type, has been designed taking into account the loads imposed on it during the installation operations and both in and out of service once the crane has been commissioned.

Tower crane bases should be designed by a competent engineer in accordance with the tower crane manufacturer's instructions and CIRIA C654 *Tower Crane Stability*.

The design of all tower crane bases should be subject to an independent design check, in accordance with Category 2 of Table 1 of BS 5975, to ensure that the concept, overall design and details of the foundation proposed are adequate and that the foundation designer's intentions have been properly reflected in the drawings to be supplied to site. The check is not intended to take the place of any checking carried out by the foundation designer, who will retain full responsibility for the adequacy of the foundation design.

Following construction and/or installation of the base an inspection should be carried out by the organisation responsible for base construction to ensure that the base has been constructed to the design specification. This inspection should include the following items, where applicable:-

All Foundations	Details in accordance with foundation designer's drawings and details.
Cast-in Items (foundation anchors etc.)	- Cast-in items supplied by crane manufacturer or approved source; - Level, vertical and to tolerance.
Reinforced Concrete	- Concrete of correct grade and sufficient maturity; - Rebar grade, diameter, quantity and location.
Piles	- Results of pile tests; - Sufficient reinforcement bond length into pile cap and pile to take tension where applicable.
Steelwork	- Steel correct grade; - Bolts tight (check if particular torque required); - Bolts and nuts paint marked after tightening (for ease of checking); - Weld quality.
Rail Tracks	- Bedding properly compacted; - Rail centres and levels to correct tolerance; - Limit ramps and end stops correctly positioned and firmly fixed; - Rails earthed.

The results of the inspection should be recorded on a Tower Crane Foundation Pre-erection Inspection Record (**See Page 2**) and kept in a "Technical File" containing appropriate design and construction details for the base, including photographs taken during base construction. This file should be available to the appointed person planning the tower crane erection, alteration, climbing or dismantling.

The appointed person should ensure that a Tower Crane Foundation Approval/Completion Form (**See Page 3**) confirming that the base has been correctly designed and installed has been completed before the erection, alteration, climbing or dismantling operation takes place.

TIN No.	031	Issue Date	28.02.15	Revision Date	28.02.20	Issue	C	Page 1 of 6
---------	-----	------------	----------	---------------	----------	-------	---	-------------

	Construction Plant-hire Association Tower Crane Interest Group				
	Tower Crane Technical Information Note				
TIN 031		Tower Crane Bases and Ties			
Tower Crane Foundation Pre-erection Inspection Report					
Site Details :					
Tower Crane No/Location:		Make:			
Height under Hook:		Model:			
Jib Length:					
Base Type:					
Items Checked (delete where not applicable)		As Specified?		Inspected By	Date
		Yes	No		
All Foundations	Compliance with design drawings/specification	☐	☐		
Cast-in Items	Supplied by tower crane manufacture or approved source	☐	☐		
	Level check	☐	☐		
	Verticality check	☐	☐		
	Within tolerance	☐	☐		
Concrete	Correct grade	☐	☐		
	Sufficient maturity	☐	☐		
	Rebar- grade, diameter, quantity and position prior to pour	☐	☐		
Piles	Satisfactory pile tests	☐	☐		
	Reinforcement bond length	☐	☐		
Steelwork	Steel grade	☐	☐		
	Weld quality	☐	☐		
	Bolts – grade, torque, tightness, quantity	☐	☐		
Rail Tracks	Bedding properly compacted	☐	☐		
	Rail and sleeper quality	☐	☐		
	Levels and gauge to tolerance	☐	☐		
	Limit ramps and end stops correctly positioned and firmly fixed	☐	☐		
	Rails correctly fixed and earthed	☐	☐		
Documents against which foundation has been checked (drawing nos./document references):					
Notes and Observations:					
I confirm the tower crane foundation has been constructed to the specifications and that a satisfactory post construction inspection has been carried out.					
Name:		Signed:		Date:	
Position:		Company:			
TIN No.	031	Issue Date	28.02.15	Revision Date	28.02.20
Issue	C	Page 2 of 6			

	Construction Plant-hire Association Tower Crane Interest Group	
	Tower Crane Technical Information Note	
TIN 031	Tower Crane Bases and Ties	

Example of a Tower Crane Foundation Approval/Completion Form

Tower Crane Foundation Approval/Completion Certificate					
Site Details :					
Tower Crane No/Location:		Make:		Model:	
Height under Hook:		Jib Length:			
Base Type:					
Foundation/Grillage Design					
Design Criteria and References:					
Drawings and Documents Issued:					
Limitations or Restrictions:					
NOTE: If the foundation design relies on the use of permanent works, the designer should state whether the permanent works have been analysed					
I certify that reasonable professional skill and care has been used in the preparation of this design, that the details have been checked for compliance with the relevant standards listed above and that the design has been accurately translated into drawings and other documents issued to site.					
Name:		Signed:		Date:	
Position:		Company:			
Foundation/Grillage Design Check*					
I certify that reasonable professional skill and care has been used in the preparation of this design, that the details have been checked for compliance with the relevant standards listed above and that the design has been accurately translated into drawings and other documents issued to site.					
Name:		Signed:		Date:	
Position:		Company:			
NOTE: A separate approval/completion certificate is required for each tower crane * Category 2 check , Table 1 of BS 5975					
Permit To Erect					
I confirm the tower crane foundation has been constructed to the specifications detailed above and a post construction inspection has been carried out (recorded on the attached report), and that the tower crane may be erected.					
Name:		Signed:		Date:	
Position:		Company:			
NOTE: The tower crane cannot be erected until the completed form is returned to the Operations Department					



2. Tower Crane Ties

Tower cranes are sometimes supported by ties attached to an adjacent structure, which is often the building under construction. These ties must be designed by a competent engineer, using loadings supplied by the tower crane owner or supplier. The designer of the supporting structure must be consulted at an early stage to ensure that the structure is capable of sustaining the loads imposed by the tower crane in-service, out-of-service and during climbing.

As with tower crane bases, all tie designs should be subject to an independent design check, in accordance with Category 2 of Table 1 of BS 5975, to ensure that the concept, overall design and details of the tie proposed are adequate and that the tie designer's intentions have been properly reflected in the drawings to be supplied to site. The check is not intended to take the place of any checking carried out by the tie designer, who will retain full responsibility for the adequacy of the tie design.

When multiple ties are installed the designer will often require that as additional ties are installed, ties lower down the tower are released to reduce the overall tie forces. The ties must however either be left in place or replaced and reconnected as the crane is climbed down during the dismantling process.

Prior to the installation of a tie an inspection should be carried out to ensure that the tie has been fabricated to the design specification. A further inspection should be carried out following installation to ensure that the tie has been fabricated to the design specification. This inspections should include the following items, where applicable:-

All Ties	Details in accordance with tie designer's drawings and details.
Steelwork	- Steel correct grade; - Dimensional check; - Bolts tight (check if particular torque required); - Weld quality.
Structure Attachment Points	Confirmation that the tie attachment points on the supporting structure will take the design tie loads
Tower Crane Mast	Vertical and to tolerance.

The results of the inspection should be recorded on a Tower Crane Tie Fabrication and Pre-installation Inspection Record (**See Page 5**) and kept in a "*Technical File*" containing appropriate design and construction details for the base, including photographs taken during tie construction and installation. This file should be available to the appointed person planning the tower crane erection, alteration, climbing or dismantling.

The appointed person should ensure that a Tower Crane Tie Approval/Completion Form (**See Page 6**) confirming that the tie has been correctly designed, manufactured (if applicable) and installed, has been completed before the erection, alteration, climbing or dismantling takes place.



Construction Plant-hire Association
Tower Crane Interest Group

Tower Crane Technical Information Note



TIN 031

Tower Crane Bases and Ties

Tower Crane Tie Fabrication and Pre-installation Inspection Report

Site Details :

Tower Crane No/Location:		Make:		Model:	
Height under Hook:		Jib Length:			
Tie Type:		Tie Position (from base):			

Items Checked (delete where not applicable)		As Specified?		Inspected By	Date
		Yes	No		
All Ties	Compliance with design drawings/specification	☐	☐		
Steelwork	Steel grade	☐	☐		
	Dimensional check	☐	☐		
	Weld quality	☐	☐		
	Bolts – grade, torque, tightness, quantity	☐	☐		
Structure Attachment Points	Confirmation that the tie attachment points on the supporting structure will take the design tie loads	☐	☐		
Tower Crane Mast	Vertical and to tolerance	☐	☐		

Documents against which tie has been checked (drawing nos./document references):

Notes and Observations:

I confirm the tower crane tie has been manufactured to the design specifications and that a satisfactory pre-installation construction inspection has been carried out.

Name:		Signed:		Date:	
Position:		Company:			



**Construction Plant-hire Association
Tower Crane Interest Group**

Tower Crane Technical Information Note



TIN 031

Tower Crane Bases and Ties

Example of a Tower Crane Tie Approval/Completion Form

Tower Crane Tie Approval/Completion Certificate

Site Details :

Tower Crane No/Location:		Make:		Model:	
Height under Hook:		Jib Length:			
Tie Type:		Tie Position (from base):			

Tie Design

Design Criteria and References:

Drawings and Documents Issued:

Limitations or Restrictions:

NOTE: Where the tie design relies on the use of permanent works for support, the designer should state whether the permanent works have been analysed

I certify that reasonable professional skill and care has been used in the preparation of this design, that the details have been checked for compliance with the relevant standards listed above and that the design has been accurately translated into drawings and other documents issued to site.

Name:		Signed:		Date:	
Position:			Company:		

Tie Design Check*

I certify that reasonable professional skill and care has been used in the preparation of this design, that the details have been checked for compliance with the relevant standards listed above and that the design has been accurately translated into drawings and other documents issued to site.

Name:		Signed:		Date:	
Position:			Company:		

NOTE: A separate approval/completion certificate is required for each tower crane * Category 2 check , Table 1 of BS 5975

Permit To Erect

I confirm the tower crane tie and tie attachment point to the supporting structure has been constructed to the specifications detailed above and a pre installation inspection has been carried out (recorded on the attached report), and that the tie may be installed.

Name:		Signed:		Date:	
Position:			Company:		

NOTE: The tower crane cannot be erected until the completed form is returned to the Operations Department