

# **REFERENCE PANEL**

## **GUIDANCE NOTES**

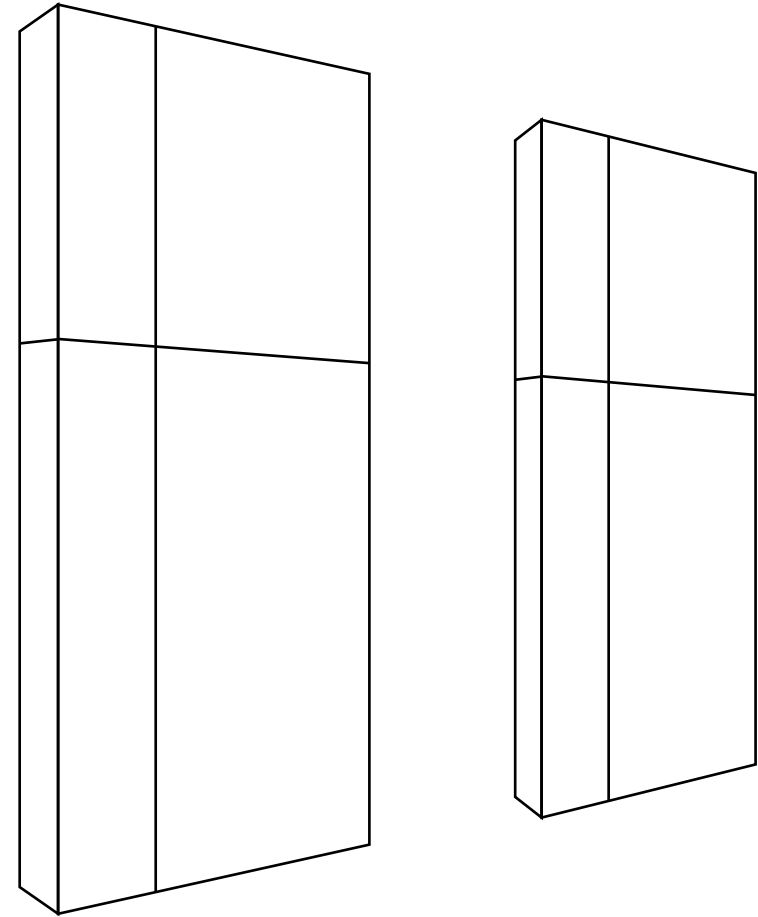


### **CONCRETE FINISHES**

to

**National Structural Concrete Specification**

**Edition 4**



The site (North East England) has been generously provided by  
**UNIVERSITY OF SHEFFIELD**

Riverside House • 4 Meadows Business Park  
Station Approach • Blackwater  
Camberley • Surrey GU17 9AB  
Tel: 01276 38444 • [www.construct.org.uk](http://www.construct.org.uk)



CONSTRUCT Concrete Structures Group Limited is an association, membership of which is based on specialist concrete contractors and associated companies in the supply chain, notably those in the ready mixed concrete, formwork and reinforcement industries. Its objectives are to promote excellence in concrete structures and to introduce measures which will improve construction efficiency and productivity.

**For further information on CONSTRUCT  
contact**

**The Executive Secretary**

**Tel: 01276 38444**

**E-mail: [enquiries@construct.org.uk](mailto:enquiries@construct.org.uk)**

The members of CONSTRUCT identified the need for physical reference panels to demonstrate typical finishes. The DETR agreed and offered 50% funding for a project to produce and locate panels at strategic sites throughout the UK. The National Concrete Frame Specification (NCFS) and subsequently, the National Structural Concrete Specification for Building and Construction, adopted the standards for concrete finish given in BS 8110 Structural Concrete and the reference panels and guidance notes have been produced for use with both specifications.

These notes have now been updated so that they are in accordance with the NSCS 4<sup>th</sup> Edition which has adopted BS EN 13670 Execution of Concrete Structures.

**CONCRETE FINISHES - REFERENCE PANELS**  
**GUIDANCE NOTES FOR INTERPRETATION AND USE**

*(Refer also to NSCS Standard Specification clause 8.6.1 and BS EN 13670: 2009 clause 8.8)*

**Introduction**

These panels constitute a realistic, consistently achievable standard as a benchmark for the benefit of the construction industry. They represent interpretations of the most often used finishes in situ concrete, agreed by a committee of experienced, professional practitioners appointed by CONSTRUCT.

It is impossible to produce panels with a perfect finish straight from the formwork. Neither is it practical to produce panels with a ‘just acceptable’ range of blemishes such as blowholes, surface irregularities, colour variation and arris lines. The panels produced have therefore been assessed in conjunction with these guidance notes. They should be reviewed from a standard distance of 3 metres and the prevailing light and ambient conditions should be taken into consideration.

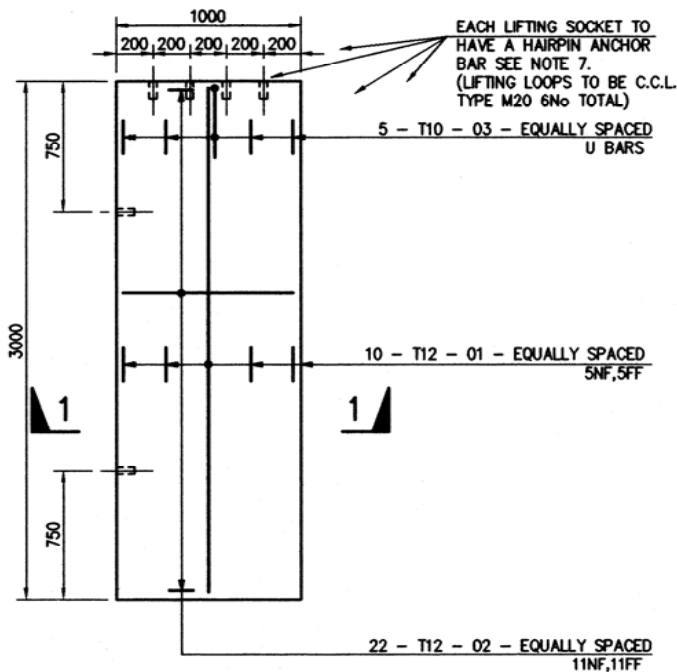
Information on the materials and methods used are only for background information. The panels are considered to be representative, irrespective of the type of material, methods and reuses of formwork used.

**Index**

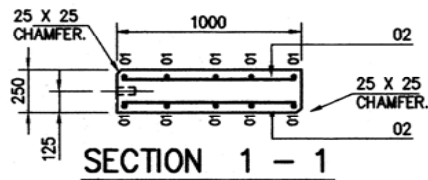
Introduction.....	Page 1	Plain Finish Panels.....	Pages 6-7
Details of Panels .....	Pages 2-3	Locations.....	Pages 8-9
Ordinary Finish Panels.....	Pages 4-5		

These panels were provided by CONSTRUCT Concrete Structures Group Ltd in association with Department of the Environment Transport and the Regions under a Partners in Technology contract.

The site has been generously provided by the **University of Sheffield**. CONSTRUCT gratefully acknowledges their co-operation and support.



**WALL ELEVATION**

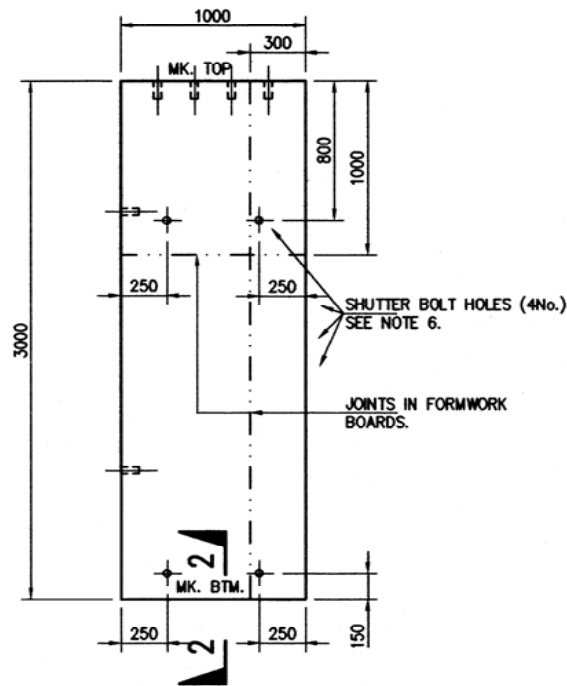


**SECTION 1 - 1**

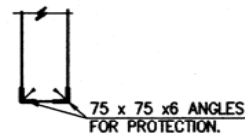
DIMS. TO B.S.4466

MARK	TYPE & SIZE	TOTAL No.	LENGTH	SHAPE CODE	A	B
01	T12	10	2900	20	STRAIGHT	
02	T12	22	900	20	STRAIGHT	
03	T10	5	900	38	400 180	

T - TYPE 2 DEFORMED BARS, GRADE 460 COMPLYING WITH BS 4449.



**FORMWORK ELEVATION**



**SECTION 2 - 2**

**NOTES**

- CONCRETE TO BE GRADE C 35 TO BS5328.
- REINFORCEMENT TO BE HIGH YIELD.
- COVER TO ALL BARS TO BE 40mm.
- MANUFACTURER TO PROVIDE SPACERS BETWEEN REINFORCEMENT MATS AS REQD. AND MAY TAKE THE FORM OF REINFORCEMENT U BARS. ALL TIE WIRE ENDS MUST BE TURNED IN, AWAY FROM THE PANEL FORMWORK SURFACE.
- BOLT HOLES FOR FORMWORK TO BE PLASTIC WITH CONES.
- ONE BOLT HOLE TO BE FILLED FLUSH (ON BOTH SIDES), AND ONE BOLT HOLE TO BE FILLED AND NEATLY RECESSED TO WITHIN 10mm BELOW SURFACE (ON BOTH SIDES).
- LIFTING SOCKETS TO BE C.C.L.M20 SOCKETS COMPLETE WITH 400mm LONG HAIRPIN T12 DIA. BARS ALL IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS OR SIMILAR AGREED.
- TOTAL PANEL WEIGHT APPROX. 1.80 TONNES.
- TWO PANELS TO BE CONSTRUCTED AS FOLLOWS :

PANEL FINISH	EACH SIDE	FORMWORK
ORDINARY	NEW	DOUGLAS FIR CIS (GOOD ONE SIDE) WITH MOULD RELEASE AGENT.
	USED	
PLAIN	NEW	PAPER FACED PLY (EVANS POURFORM) WITH MOULD RELEASE AGENT.
	USED	

- PANELS MUST BE CONSTRUCTED IN THE VERTICAL POSITION AS WALL PANELS WITH TOP & BTM. POSITIONS AS MARKED.
- FORMWORK TO BE OF THE SAME CONSTRUCTION TO ALL PANELS.

E	NOTES 1, 2, & 6 AMENDED	V.R.D.	16/2/98	A.W.
Mark	Revision	Chkd	Date	Drn

**PETER BRETT ASSOCIATES**  
CONSULTING ENGINEERS

**pba**

19 WESTOOTE ROAD READING BERKSHIRE RG30 2DE TEL. 01734 006781 FAX 01734 507406

Scale	1:25	Ord Ref	C:\ALAN\TOP_MILL
Date	SEPT 05	Drawn	A.W.
Checked	VRD	Passed	VRD
		Drawing No	<b>OPR/100</b>

## DETAILS OF PANELS - CONSTRUCTION DETAILS (North East)

<b>CONCRETE C28/35</b>	<b>Materials:</b>	Cement	<i>CEM I</i>	- Castle, Ketton
		Aggregate	<i>20-5 L/ST</i>	- Longcliffe, Brassington
		Sand	<i>Sand M</i>	- RMC Aggregates, Attenborough
	<b>Mix details:</b>			- 330kg/m <sup>3</sup> cement; w/c 0.50; agg/cem 5.61; 37.2% sand
<b>FORMWORK</b>  backed	<b>Design:</b>	Pour rate	<i>Both finishes</i>	6 m/h
		Consistence	<i>Both finishes</i>	50 mm Slump
		Temperature	<i>Both finishes</i>	Concrete +5 °C min.: Air 15-25 °C
	<b>Materials:</b>	Face sheeting	<i>Ordinary finish</i>	Douglas fir G1S plywood; Plastic splay arris formers
			<i>Plain finish</i>	Resin impregnated paper faced plywood (Pourform)
		Secondary support	<i>Both finishes</i>	Timber 100mm x 75mm nominal PAR; ply joints
	Primary support	<i>Both finishes</i>	Steel soldiers - RMD II	
	Release agent	<i>Ordinary finish</i>	Chemical - Admast Adolease	
		<i>Plain finish</i>	Chemical - Admast Adolease	
<b>REINFORCEMENT</b>		<i>See Page 2</i>	<i>Both panels</i>	
<b>CONSTRUCTION</b>	<b>Delivery:</b>	Concrete	<i>Both finishes</i>	Ready-mixed (approx 30 min travel)
	<b>Consistence:</b>	Concrete	<i>Both finishes</i>	50 mm Slump
	<b>Placing:</b>	Concrete	<i>Both finishes</i>	Crane and skip
	<b>Pour rate:</b>	Concrete	<i>Both finishes</i>	5 m/hr
	<b>Compaction:</b>	Concrete	<i>Both finishes</i>	Internal vibrator - 50mm poker petrol driven
	<b>Temperature:</b>		<i>Both finishes</i>	Concrete (unknown) ; Air 8 °C
	<b>Striking:</b>	Formwork	<i>Both finishes</i>	After approx. 24 hours
	<b>Curing:</b>	Concrete	<i>Both Finishes</i>	Exposed to the weather for 7 days

## **ORDINARY FINISH - GUIDANCE**

This is for use where visual quality is not important or it is to receive applied finishes. It is recommended that this finish is not used where surfaces are only to be painted. The use of small panel forming systems is considered suitable for producing this finish. Joints between formwork panels will show and the step may be up to 5mm. Grain marks are generally due to slight absorbance variations causing local colour variation, but the surface is generally smooth. Panels and bolt holes may not be a regular pattern. Colour of the finish will vary with the concrete delivered, the release agent used and reuse of the forming material. Project sample panels should not be specified for this finish. As the concrete finish is not important visually, making good is acceptable and so blowholes and minor surface blemishes can either be dealt with or accepted untreated by agreement between the CA and Constructor based on achieving an overall standard similar to the reference panels. If a system formwork is to be used eg Peri Trio/Duo, the finish of the formwork will generally be acceptable and the CA is expected to be aware of its quality.

## ORDINARY FINISH - INTERPRETATION (North East)

SIDE 1 first use

SIDE 2 reused

These panels are typical of what should be expected of an Ordinary finish subject to the comments below

### Surface Blemishes

Larger blowholes may need filling for exposed finish

Note: Sealing of joints in formwork would reduce grout loss at edges

### Abrupt Irregularities

Poker damage to form face may need removal for exposed finish

All joints and 'nailheads' within specification

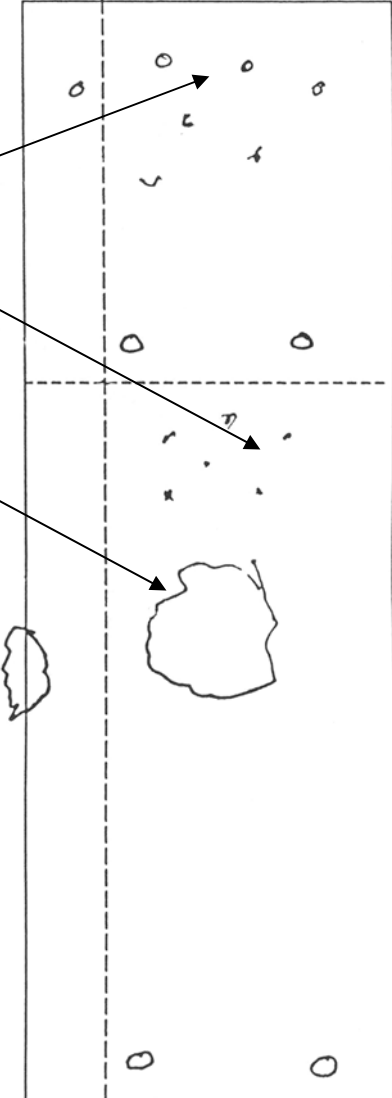
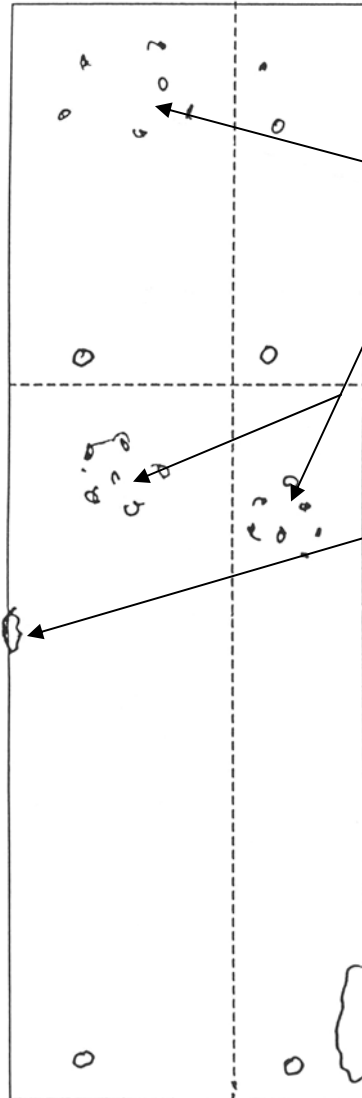
### Making Good

Grout loss should be made good (as done to panel return)

Typical bolt hole making good shown - recessed and flush

### General

Both side have a greater frequency of small and large blowholes than should be expected



## **PLAIN FINISH - GUIDANCE**

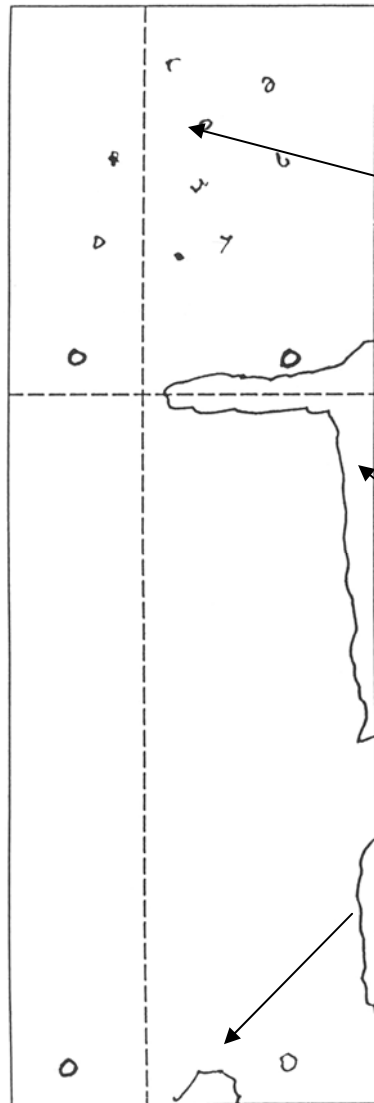
A Plain finish is for use where visual quality is of some importance such as areas occasionally seen or to be directly painted. The use of sheet material to limit jointing in forming material is considered suitable for producing this finish. In any one visible elevation the sheets should be of the same type and have had the same number of previous uses. Joints between formwork panels will show and the step may be up to 3mm. Tie-bolt holes should ideally be recessed, or alternatively filled flush, although this may not be so aesthetically pleasing. Panels and bolt holes should be in a regular pattern. Colour of the finish will change with concrete delivered and reuse of the forming material. A special product sample panel should not be specified for this finish, but a project example should be produced as one of the first areas of concrete poured on the project and used as the benchmark for the rest of the concrete.



## PLAIN FINISH - INTERPRETATION (North East)

SIDE 1 first use

SIDE 2 reused



These panels are typical of what should be expected of a Plain finish subject to the comments below

### Surface Blemishes

Larger holes require filling and fewer should be expected

Note examples of bolt hole filling - flush and recessed

Note: Mastic sealing of joints in formwork would reduce grout loss at edges

### Abrupt Irregularities

All within 3mm requirement

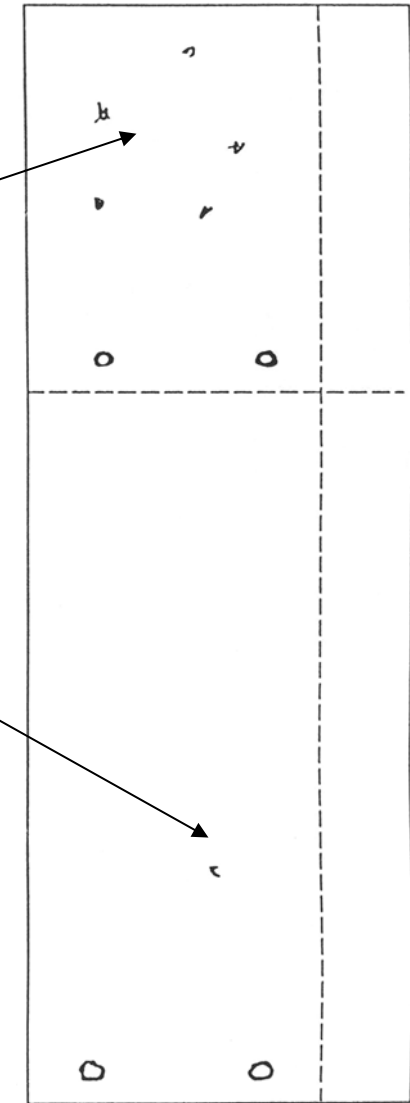
### Colour

Black stains caused by handling during erection of panels

Colour variation is as expected on reuse may reduce with weathering

### General

Both sides meet the specification with filling of large hole blemishes



## LOCATION OF ALL SITES IN UK DISPLAYING PANELS

London South (External Site)	The Medway School of Engineering Medway University Campus University of Greenwich Chatham Maritime, Kent ME4 4TB	Tel: 020 8331 8368 E-mail: t.d.stevens@gre.ac.uk	Tony Stevens
Central England (External Site)	PERI Ltd Market Harborough Road Clifton upon Dunsmore Rugby CV23 0AN	Tel: 01788 861600 E-mail: peter.stenning@peri.ltd.uk	Peter Stenning
North East England (Internal Site)	University of Sheffield Sir Frederick Mappin Building Mappin Street Sheffield S1 3JD	Tel: 0114 225 754 E-mail: k.nash@sheffield.ac.uk	Kieran Nash
Scotland (Internal Site)	University of Paisley High Street Paisley PA1 2BE	Tel: 0141 848 3280 E-mail: minna.roebuck@uws.ac.uk	Minna Roebuck



**LOCATION OF PANELS**

**Scotland**

University of Paisley  
Paisley Campus  
**Glasgow**

**North East England**

University of Sheffield  
Mapping Street  
**Sheffield**

**Central England**

PERI Ltd  
Clifton upon Dunsmore  
**Nr Rugby**

**London South**

Medway University Campus  
University of Greenwich  
**Chatham Maritime**