a) for a period of between one and three years, a suitable production welding test shall be carried out for steel grades higher than S355. Examination and testing shall include visual inspection, radiographic or ultrasonic inspection (not required for fillet welds), surface crack detection by magnetic particle or penetrant test, macro-examination and hardness test;

b) for a period of more than three years,

   1) a macro specimen taken from a production test shall be inspected for acceptability for steel grades up to and including S355, or

   2) new welding procedure tests shall be carried out for steel grades higher than S355 as relevant.

For resistance welding, the welding parameters may be determined using tests according to EN ISO 10447.

7.4.2 Welders and welding operators

Welders shall be qualified in accordance with EN 287-1 and welding operators in accordance with EN 1418.

Welding hollow section branch connection with angles less than 60° shall be qualified by specific test.

Records of all welder and welding operator qualification tests shall be kept available.

7.4.3 Welding coordination

For EXC2, EXC3 and EXC4, welding coordination shall be maintained during the execution of welding by welding coordination personnel suitably qualified for, and experienced in the welding operations they supervise as specified in EN ISO 14731.

With respect to the welding operations being supervised, welding coordination personnel shall have a technical knowledge according to Tables 14 and 15.

NOTE 1 Steel groups are those defined in ISO/TR 15608. Correspondence to steel grades and reference standards can be found in ISO/TR 20172.

NOTE 2 B, S and C are respectively basic, specific and comprehensive knowledge as specified in EN ISO 14731.

Table 14 — Technical knowledge of the coordination personnel
Structural carbon steels

EXC	Steels (steel group)	Reference standards	Thickness (mm)		
			$t \leq 25$ [a]	$25 < t \leq 50$ [b]	$t > 50$
EXC2	S235 to S355 (1.1, 1.2, 1.4)	EN 10025-2, EN 10025-3, EN 10025-4 EN 10025-5, EN 10149-2, EN 10149-3 EN 10210-1, EN 10219-1	B	S	C [c]
	S420 to S700 (1.3, 2, 3)	EN 10025-3, EN 10025-4, EN 10025-6 EN 10149-2, EN 10149-3 EN 10210-1, EN 10219-1	S	C [d]	C
EXC3	S235 to S355 (1.1, 1.2, 1.4)	EN 10025-2, EN 10025-3, EN 10025-4 EN 10025-5, EN 10149-2, EN 10149-3 EN 10210-1, EN 10219-1	S	C	C
	S420 to S700 (1.3, 2, 3)	EN 10025-3, EN 10025-4, EN 10025-6 EN 10149-2, EN 10149-3 EN 10210-1, EN 10219-1	C	C	C
EXC4	All	All	C	C	C

[a] Column base plates and endplates ≤ 50 mm.
[b] Column base plates and endplates ≤ 75 mm.
[c] For steels up to and including S275, level S is sufficient.
[d] For steels N, NL, M and ML, level S is sufficient.

Table 15 — Technical knowledge of the coordination personnel
Stainless steels

EXC	Steels (steel group)	Reference standards	Thickness (mm)		
			$t \leq 25$	$25 < t \leq 50$	$t > 50$
EXC2	Austenitic (8)	EN 10088-2:2005, Table 3 EN 10088-3:2005, Table 4 EN 10296-2:2005, Table 1 EN 10297-2:2005, Table 2	B	S	C
	Austenitic-ferritic (10)	EN 10088-2:2005, Table 4 EN 10088-3:2005, Table 5 EN 10296-2:2005, Table 1 EN 10297-2:2005, Table 3	S	C	C
EXC3	Austenitic (8)	EN 10088-2:2005, Table 3 EN 10088-3:2005, Table 4 EN 10296-2:2005, Table 1 EN 10297-2:2005, Table 2	S	C	C
	Austenitic-ferritic (10)	EN 10088-2:2005, Table 4 EN 10088-3:2005, Table 5 EN 10296-2:2005, Table 1 EN 10297-2:2005, Table 3	C	C	C
EXC4	All	All	C	C	C

7.5 Preparation and execution of welding

7.5.1 Joint preparation

7.5.1.1 General

Joint preparation shall be appropriate for the welding process. If qualification of welding procedures is performed in accordance with EN ISO 15614-1, EN ISO 15612 or EN ISO 15613 joint preparation shall comply with the type of preparation used in the welding procedure test. Tolerances for joints preparations and fit-up shall be given in the WPSs.

NOTE 1 EN ISO 9692-1 and EN ISO 9692-2 give some recommended weld preparation details. For weld preparation details of bridge decks, see EN 1993-2:2006, Annex C.

Joint preparation shall be free from visible cracks. For steel grades higher than S460, cut areas shall be descaled by grinding, and verified to be free from cracks by visual inspection, dye penetrant or magnetic particle testing. Visible cracks shall be removed by grinding and the joint geometry corrected as necessary.

If large notches or other errors in joint geometry are corrected by welding a qualified procedure shall be used, and the area shall be subsequently ground smooth and feathered into the adjacent surface.

All surfaces to be welded shall be dry and free from material that would adversely affect the quality of the welds or impede the process of welding (rust, organic material or galvanizing).

Prefabrication primers (shop primers) may be left on the fusion faces only if they do not adversely affect the welding process. For EXC3 and EXC4, prefabrication primers shall not be left on the fusion faces, unless welding procedure tests in accordance with EN ISO 15614-1 or EN ISO 15613 have been completed using such prefabrication primers.

NOTE 2 EN ISO 17652-2 describes tests for assessing the influence of shop primers on the weldability.