Table 8.1: Plain members and mechanically fastened joints

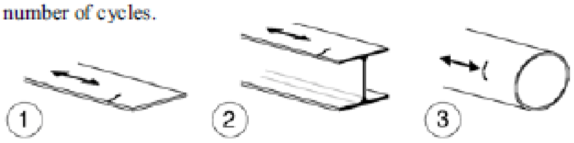
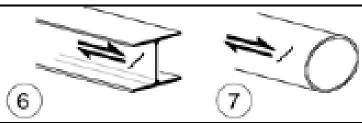
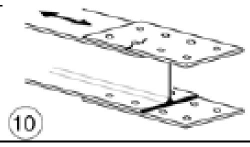
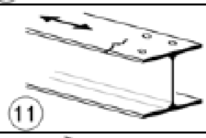
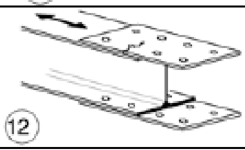
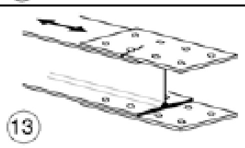
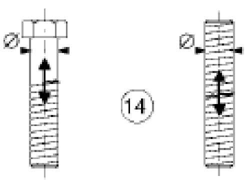
Detail category	Constructional detail	Description	Requirements	
160	**NOTE** The fatigue strength curve associated with category 160 is the highest. No detail can reach a better fatigue strength at any number of cycles. 	(AC2) Rolled or extruded products: 1) Plates and flats with as rolled edges; 2) Rolled sections with as rolled edges; (AC2) 3) Seamless hollow sections, either rectangular or circular.	Details 1) to 3): Sharp edges, surface and rolling flaws to be improved by grinding until removed and smooth transition achieved.	
140		Sheared or gas cut plates: 4) Machine gas cut or sheared material with subsequent dressing. 5) Material with machine gas cut edges having shallow and regular drag lines or manual gas cut material, subsequently dressed to remove all edge discontinuities. Machine gas cut with cut quality according to EN 1090.	4) All visible signs of edge discontinuities to be removed. The cut areas are to be machined or ground and all burrs to be removed. Any machinery scratches for example from grinding operations, can only be parallel to the stresses. Details 4) and 5): -Re-entrant corners to be improved by grinding (slope ≤ ¼) or evaluated using the appropriate stress concentration factors. -No repair by weld refill.	
125				
100 m = 5		(AC2) 6) and 7) Rolled or extruded products as in details 1), 2), 3) (AC2)	Details 6) and 7): $\Delta\tau$ calculated from: $\tau = \frac{V\,S(t)}{I\,t}$	
For detail 1 – 5 made of weathering steel use the next lower category.				
112		8) Double covered symmetrical joint with preloaded high strength bolts.	8) $\Delta\sigma$ to be calculated on the gross cross-section.	For bolted connections (Details 8) to 13)) in general: End distance: $e_1 \geq 1{,}5\ d$ Edge distance: $e_2 \geq 1{,}5\ d$ Spacing: $p_1 \geq 2{,}5\ d$ Spacing: $p_2 \geq 2{,}5\ d$ Detailing to EN 1993-1-8, Figure 3.1
		8) Double covered symmetrical joint with preloaded injection bolts.	8) ... gross cross-section.	
90		9) Double covered joint with fitted bolts.	9) ... net cross-section.	
		9) Double covered joint with non preloaded injection bolts.	9) ... net cross-section.	
		10) One sided connection with preloaded high strength bolts.	10) ... gross cross-section.	
		10) One sided connection with preloaded injection bolts.	10) ... gross cross-section.	
		11) Structural element with holes subject to bending and axial forces	11) ... net cross-section.	
80		12) One sided connection with fitted bolts.	12) ... net cross-section.	
		12) One sided connection with non-preloaded injection bolts.	12) ... net cross-section.	
50		13) One sided or double covered symmetrical connection with non-preloaded bolts in normal clearance holes. No load reversals.	13) ... net cross-section.	
50	size effect for $t > 30$mm: $k_s = (30/t)^{0,25}$ 	14) Bolts and rods with rolled or cut threads in tension. For large diameters (anchor bolts) the size effect has to be taken into account with k_s.	14) $\Delta\sigma$ to be calculated using the tensile stress area of the bolt. Bending and tension resulting from prying effects and bending stresses from other sources must be taken into account. For preloaded bolts, the reduction of the stress range may be taken into account.	

Table 8.1 (continued): Plain members and mechanically fastened joints

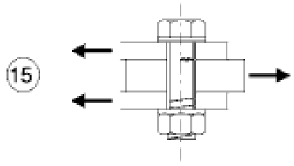
Detail category	Constructional detail	Description	Requirements
100 m=5		<u>Bolts in single or double shear</u> Thread not in the shear plane 15) - Fitted bolts - normal bolts without load reversal (bolts of grade 5.6, 8.8 or 10.9)	15) $\Delta\tau$ calculated on the shank area of the bolt.

Table 8.2: Welded built-up sections

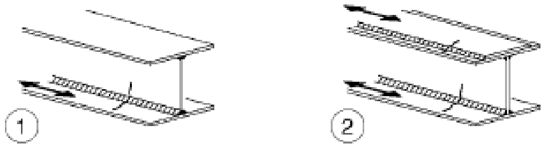
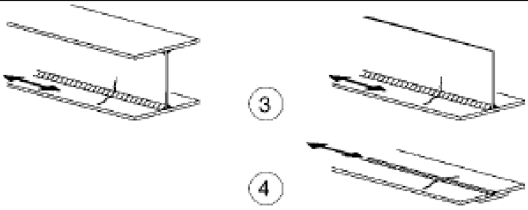
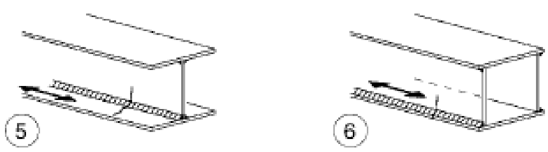
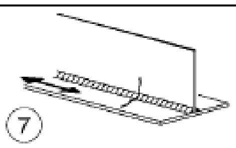
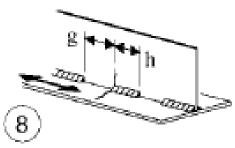
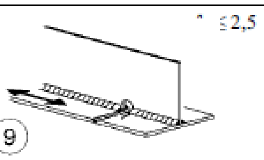
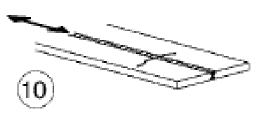
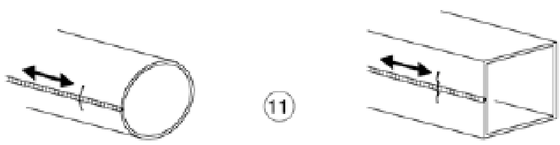
Detail category	Constructional detail	AC2 Description	Requirements
125		<u>Continuous longitudinal welds:</u> 1) Automatic or fully mechanized butt welds carried out from both sides. 2) Automatic or fully mechanized fillet welds. Cover plate ends to be checked using detail 6) or 7) in Table 8.5.	<u>Details 1) and 2):</u> No stop/start position is permitted except when the repair is performed by a specialist and inspection is carried out to verify the proper execution of the repair.
112		3) Automatic or fully mechanized fillet or butt weld carried out from both sides but containing stop/start positions. 4) Automatic or fully mechanized butt welds made from one side only, with a continuous backing bar, but without start/stop positions.	4) When this detail contains stop/start positions category 100 to be used.
100		5) Manual fillet or butt weld. 6) Manual or automatic or fully mechanized butt welds carried out from one side only, particularly for box girders	5), 6) A very good fit between the flange and web plates is essential. The web edge to be prepared such that the root face is adequate for the achievement of regular root penetration without break-out.
100		7) Repaired automatic or fully mechanized or manual fillet or butt welds for categories 1) to 6).	7) Improvement by grinding performed by specialist to remove all visible signs and adequate verification can restore the original category.
80		8) Intermittent longitudinal fillet welds.	8) $\Delta\sigma$ based on direct stress in flange.
71		9) Longitudinal butt weld, fillet weld or intermittent weld with a cope hole height not greater than 60 mm. For cope holes with a height > 60 mm see detail 1) in Table 8.4	9) $\Delta\sigma$ based on direct stress in flange.
125		10) Longitudinal butt weld, both sides ground flush parallel to load direction, 100% NDT	
112		10) No grinding and no start/stop	
90		10) with start/stop positions	
140		11) Automatic or fully mechanized longitudinal seam weld without stop/start positions in hollow sections	11) Wall thickness $t \leq 12{,}5$ mm.
125		11) Automatic or fully mechanized longitudinal seam weld without stop/start positions in hollow sections	11) Wall thickness $t > 12{,}5$ mm. AC2
90		11) with stop/start positions	
For details 1 to 11 made with fully mechanized welding the categories for automatic welding apply.			

Table 8.3: Transverse butt welds

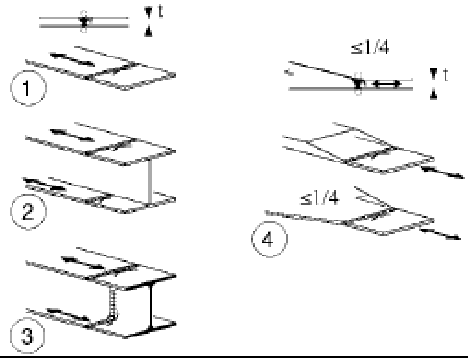
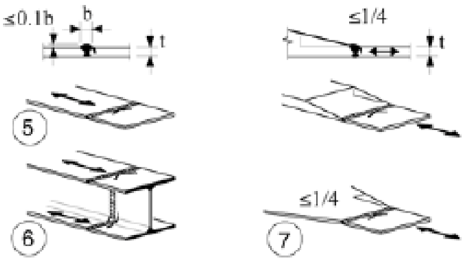
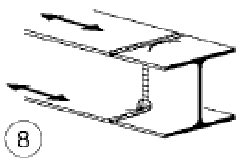
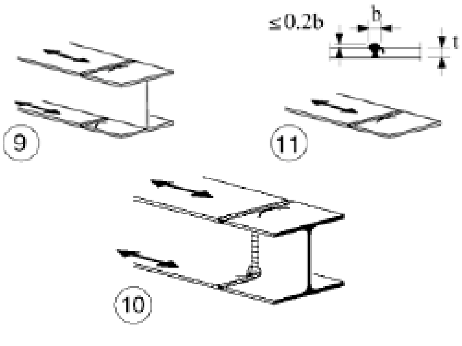
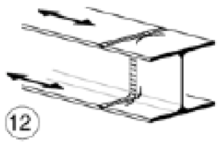
Detail category	Constructional detail		Description	Requirements
112	size effect for t>25mm: $k_s=(25/t)^{0,2}$		<u>Without backing bar:</u> 1) Transverse splices in plates and flats. 2) Flange and web splices in plate girders before assembly. 3) Full cross-section butt welds of rolled sections without cope holes. 4) Transverse splices in plates or flats tapered in width or in thickness, with a slope ≤ ¼.	- All welds ground flush to plate surface parallel to direction of the arrow. - Weld run-on and run-off pieces to be used and subsequently removed, plate edges to be ground flush in direction of stress. - Welded from both sides; checked by NDT. <u>Detail 3):</u> Applies only to joints of rolled (AC2) sections, cut and welded. (AC2)
90	size effect for t>25mm: $k_s=(25/t)^{0,2}$		5) Transverse splices in plates or flats. 6) Full cross-section butt welds of rolled sections without cope holes. 7) Transverse splices in plates or flats tapered in width or in thickness with a slope ≤ ¼. Translation of welds to be machined notch free.	- The height of the weld convexity to be not greater than 10% of the weld width, with smooth transition to the plate surface. - Weld run-on and run-off pieces to be used and subsequently removed, plate edges to be ground flush in direction of stress. - Welded from both sides; checked by NDT. <u>Details 5 and 7:</u> Welds made in flat position.
90	size effect for t>25mm: $k_s=(25/t)^{0,2}$		8) As detail 3) but with cope holes.	- All welds ground flush to plate surface parallel to direction of the arrow. - Weld run-on and run-off pieces to be used and subsequently removed, plate edges to be ground flush in direction of stress. - Welded from both sides; checked by NDT. - Rolled sections with the same dimensions without tolerance differences
80	size effect for t>25mm: $k_s=(25/t)^{0,2}$		9) Transverse splices in welded plate girders without cope hole. 10) Full cross-section butt welds of rolled sections with cope holes. 11) Transverse splices in plates, flats, rolled sections or plate girders.	- The height of the weld convexity to be not greater than 20% of the weld width, with smooth transition to the plate surface. - Weld not ground flush - Weld run-on and run-off pieces to be used and subsequently removed, plate edges to be ground flush in direction of stress. - Welded from both sides; checked by NDT. <u>Detail 10:</u> The height of the weld convexity to be not greater than 10% of the weld width, with smooth transition to the plate surface.
63			12) Full cross-section butt welds of rolled sections without cope hole.	- Weld run-on and run-off pieces to be used and subsequently removed, plate edges to be ground flush in direction of stress. - Welded from both sides.

Table 8.3 (continued): Transverse butt welds

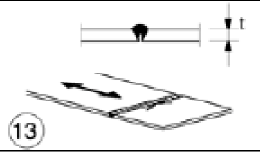
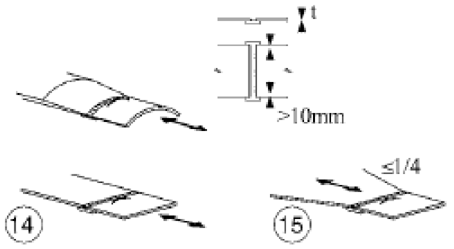
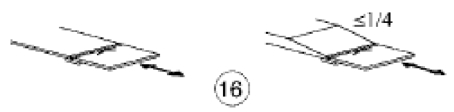
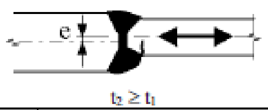
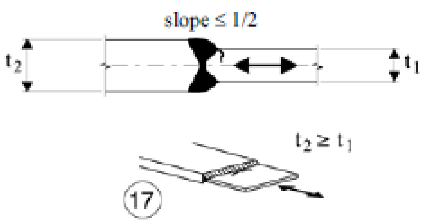
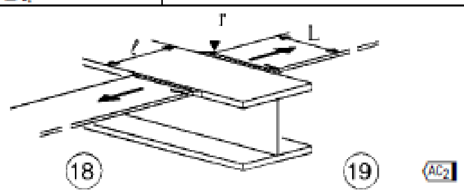
Detail category	Constructional detail	Description	Requirements
36		13) Butt welds made from one side only.	13) Without backing strip.
71	size effect for t>25mm: $k_s=(25/t)^{0,2}$	13) Butt welds made from one side only when full penetration checked by appropriate NDT.	
71	size effect for t>25mm: $k_s=(25/t)^{0,2}$ 	<u>With backing strip:</u> 14) Transverse splice. 15) Transverse butt weld tapered in width or thickness with a slope ≤ ¼. Also valid for curved plates.	<u>Details 14) and 15):</u> Fillet welds attaching the backing strip to terminate ≥ 10 mm from the edges of the stressed plate. Tack welds inside the shape of butt welds.
50	size effect for t>25mm: $k_s=(25/t)^{0,2}$ 	16) Transverse butt weld on a permanent backing strip tapered in width or thickness with a slope ≤ ¼. Also valid for curved plates.	16) Where backing strip fillet welds end < 10 mm from the plate edge, or if a good fit cannot be guaranteed.
71	size effect for t>25mm and/or generalization for eccentricity: $k_s=\left(\frac{25}{t_1}\right)^{0,2} \Big/ \left(1+\frac{6e}{t_1}\frac{t_1^{1,5}}{t_1^{1,5}+t_2^{1,5}}\right)$  	17) Transverse butt weld, different thicknesses without transition, centrelines aligned.	
AC2) 40	 (AC2	18) Transverse butt weld at intersecting flanges.	<u>Details 18) and 19)</u> The fatigue strength of the continuous component has to be checked with Table 8.4, detail 4 or detail 5.
As detail 4 in Table 8.4		19) With transition radius according to Table 8.4, detail 4	

Table 8.4: Weld attachments and stiffeners

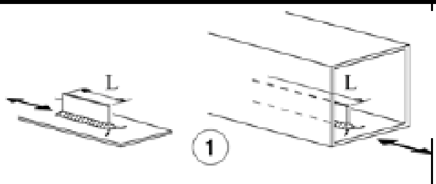
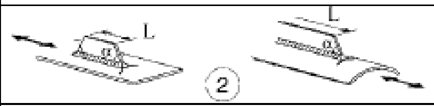
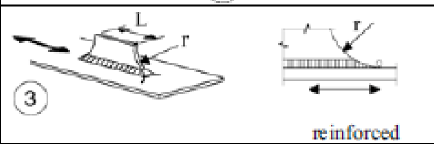
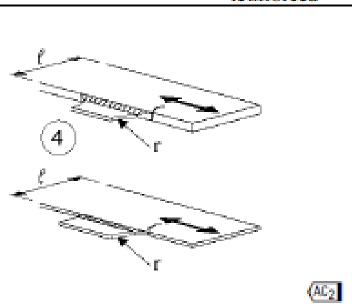
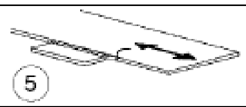
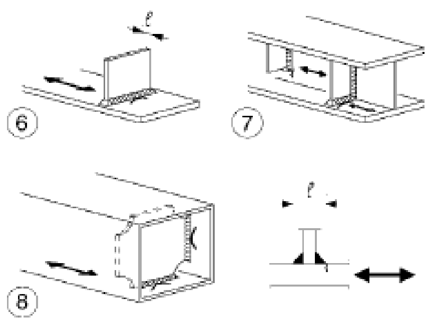
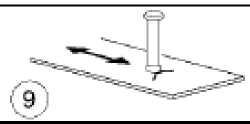
Detail category	Constructional detail		Description	Requirements
80	$L \leq 50mm$		<u>Longitudinal attachments:</u> 1) The detail category varies according to the length of the attachment L.	The thickness of the attachment must be less than its height. If not see Table 8.5, details 5 or 6.
71	$50 < L \leq 80mm$			
63	$80 < L \leq 100mm$			
56	$L > 100mm$			
71	$L > 100mm$ $\alpha < 45°$		2) Longitudinal attachments to plate or tube.	
80	$r > 150mm$		3) Longitudinal fillet welded gusset with radius transition to plate or tube; end of fillet weld reinforced (full penetration); length of reinforced weld > r.	<u>Details 3) and 4):</u> Smooth transition radius r formed by initially machining or gas cutting the gusset plate before welding, then subsequently grinding the weld area parallel to the direction of the arrow so that the transverse weld toe is fully removed.
AC2 90	$\frac{r}{\ell} \geq \frac{1}{3}$ or $r > 150mm$		4) Gusset plate, welded to the edge of a plate or beam flange.	
71	$\frac{1}{6} \leq \frac{r}{\ell} \leq \frac{1}{3}$			
50	$\frac{r}{\ell} < \frac{1}{6}$			
40			5) As welded, no radius transition.	
80	$\ell \leq 50mm$		<u>Transverse attachments:</u> 6) Welded to plate. 7) Vertical stiffeners welded to a beam or plate girder. 8) Diaphragm of box girders welded to the flange or the web. May not be possible for small hollow sections. The values are also valid for ring stiffeners.	<u>Details 6) and 7):</u> Ends of welds to be carefully ground to remove any undercut that may be present. 7) $\Delta\sigma$ to be calculated using principal stresses if the stiffener terminates in the web, see left side.
71	$50 < \ell \leq 80mm$			
80			9) The effect of welded shear studs on base material.	

Table 8.5: Load carrying welded joints

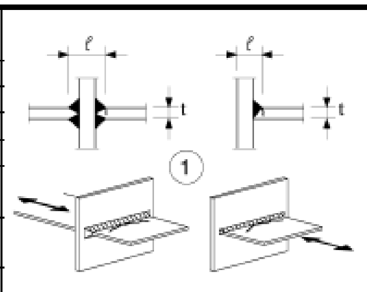
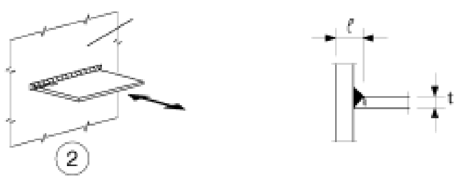
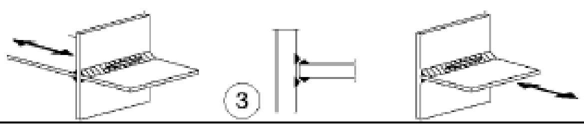
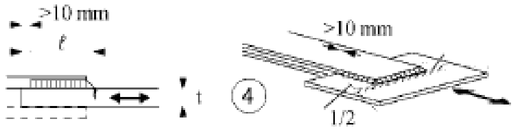
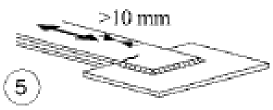
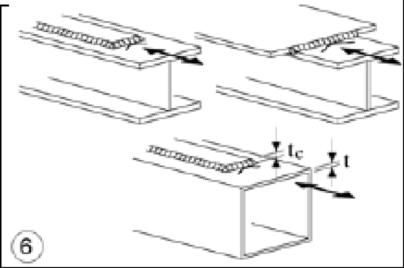
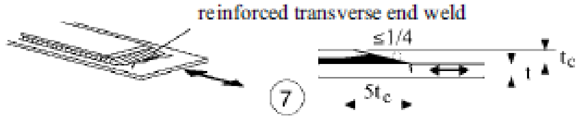
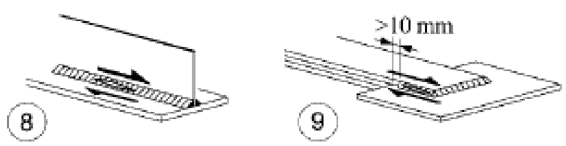
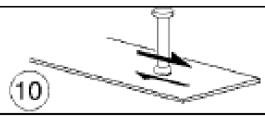
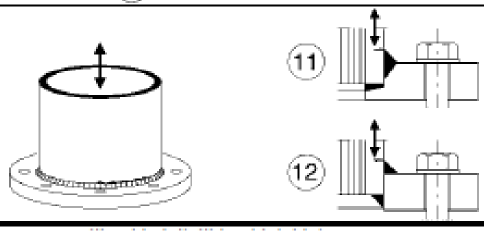
AC2 Detail category	ℓ / $t_c<t$	t / $t_c \geq t$	Constructional detail	Description	Requirements
80	ℓ<50 mm	all t [mm]		Cruciform and Tee joints: 1) Toe failure in full penetration butt welds and all partial penetration joints.	1) Inspected and found free from discontinuities and misalignments outside the tolerances of EN 1090. 2) For computing Δσ, use modified nominal stress. 3) In partial penetration joints two fatigue assessments are required. Firstly, root cracking evaluated according to stresses defined in section 5, using category 36* for $\Delta\sigma_w$ and category 80 for $\Delta\tau_w$. Secondly, toe cracking is evaluated by determining Δσ in the load-carrying plate. Details 1) to 3): The misalignment of the load-carrying plates should not exceed 15 % of the thickness of the intermediate plate.
71	50<ℓ≤80	all t			
63	80<ℓ≤100	all t			
56	100<ℓ≤120	all t			
56	ℓ>120	t≤20			
50	120<ℓ≤200 ℓ>200	t>20 20<t≤30			
45	200<ℓ≤300 ℓ>300	t>30 30<t≤50			
40	ℓ>300	t>50			
As detail 1 in Table 8.5			flexible panel 	2) Toe failure from edge of attachment to plate, with stress peaks at weld ends due to local plate deformations.	
36*				3) Root failure in partial penetration Tee-butt joints or fillet welded joint and in Tee-butt weld, according to Figure 4.6 in EN 1993-1-8:2005. AC2	
As detail 1 in Table 8.5			stressed area of main panel: slope = 1/2	Overlapped welded joints: 4) Fillet welded lap joint.	4) Δσ in the main plate to be calculated on the basis of area shown in the sketch. 5) Δσ to be calculated in the overlapping plates. Details 4) and 5): - Weld terminations more than 10 mm from plate edge. - Shear cracking in the weld should be checked using detail 8).
45*				Overlapped: 5) Fillet welded lap joint.	
	$t_c<t$	$t_c \geq t$		Cover plates in beams and plate girders: 6) End zones of single or multiple welded cover plates, with or without transverse end weld.	6) If the cover plate is wider than the flange, a transverse end weld is needed. This weld should be carefully ground to remove undercut. The minimum length of the cover plate is 300 mm. For shorter attachments size effect see detail 1).
56*	t≤20	-			
50	20<t≤30	t≤20			
45	30<t≤50	20<t≤30			
40	t>50	30<t≤50			
36	-	t>50			
56			reinforced transverse end weld 	7) Cover plates in beams and plate girders. $5t_c$ is the minimum length of the reinforcement weld.	7) Transverse end weld ground flush. In addition, if t_c>20mm, front of plate at the end ground with a slope < 1 in 4.
80 m=5				8) Continuous fillet welds transmitting a shear flow, such as web to flange welds in plate girders. 9) Fillet welded lap joint.	8) Δτ to be calculated from the weld throat area. 9) Δτ to be calculated from the weld throat area considering the total length of the weld. Weld terminations more than 10 mm from the plate edge, see also 4) and 5) above.
see EN 1994-2 (90 m=8)				Welded stud shear connectors: 10) For composite application	10) Δτ to be calculated from the nominal cross section of the stud.
71				11) Tube socket joint with 80% full penetration butt welds.	11) Weld toe ground. Δσ computed in tube.
40				12) Tube socket joint with fillet welds.	12) Δσ computed in tube.

Table 8.6: Hollow sections (t ≤ 12,5 mm)

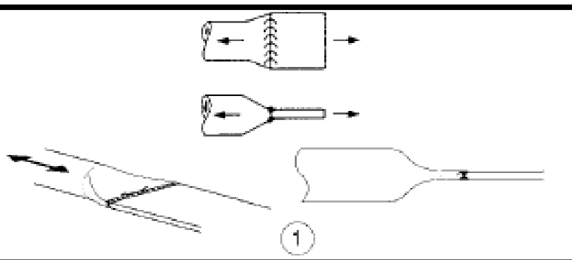
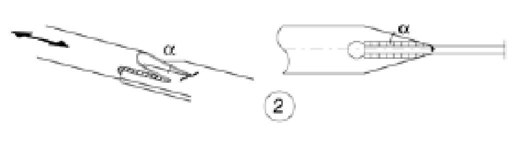
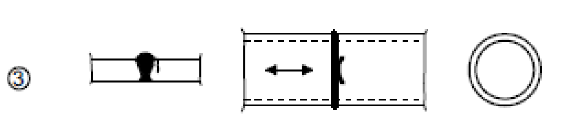
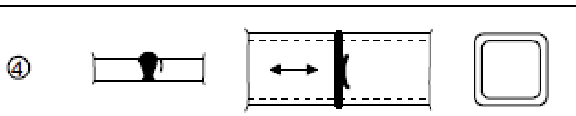
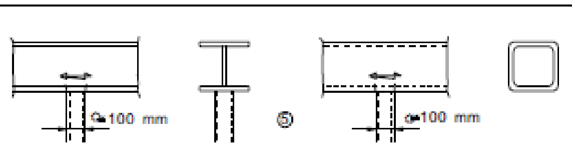
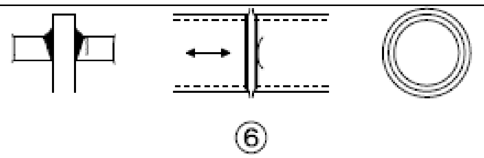
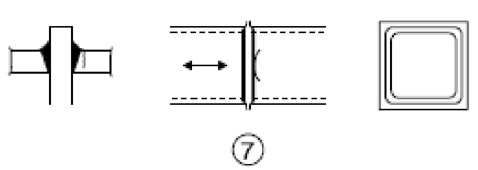
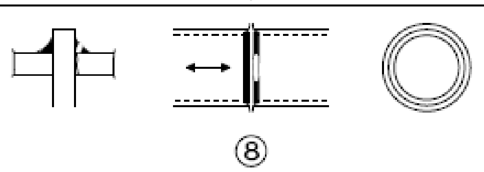
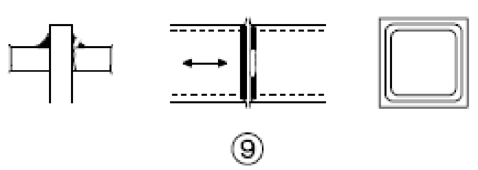
Detail category	Constructional detail	Description	Requirements
71		1) Tube-plate joint, tubes flatted, butt weld (X-groove)	1) Δσ computed in tube. Only valid for tube diameter less than 200 mm.
71	α≤45° 	2) Tube-plate joint, tube slitted and welded to plate. Holes at end of slit.	2) Δσ computed in tube. Shear cracking in the weld should be verified using Table 8.5, detail 8).
63	α>45°		
71		Transverse butt welds: 3) Butt-welded end-to-end connections between circular structural hollow sections.	Details 3) and 4): -Weld convexity ≤ 10% of weld width, with smooth transitions. -Welded in flat position, inspected and found free from defects outside the tolerances EN 1090. -Classify 2 detail categories higher if t > 8 mm.
56		4) Butt-welded end-to-end connections between rectangular structural hollow sections.	
71		Welded attachments: 5) Circular or rectangular structural hollow section, fillet-welded to another section.	5) -Non load-carrying welds. -Width parallel to stress direction ℓ ≤ 100 mm. -Other cases see Table 8.4.
50		Welded splices: 6) Circular structural hollow sections, butt-welded end-to-end with an intermediate plate.	Details 6) and 7): -Load-carrying welds. -Welds inspected and found free from defects outside the tolerances of EN 1090. -Classify 1 detail category higher if t > 8 mm.
45		7) Rectangular structural hollow sections, butt welded end-to-end with an intermediate plate.	
40		8) Circular structural hollow sections, fillet-welded end-to-end with an intermediate plate.	Details 8) and 9): -Load-carrying welds. -Wall thickness t ≤ 8 mm.
36		9) Rectangular structural hollow sections, fillet-welded end-to-end with an intermediate plate.	

Table 8.7: Lattice girder node joints

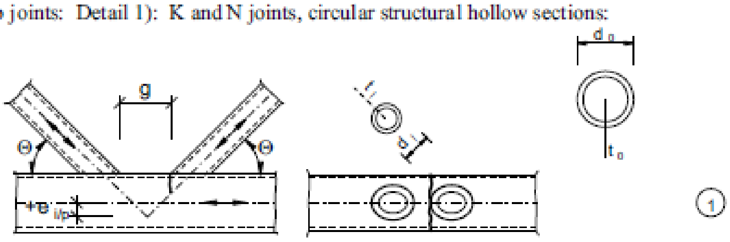
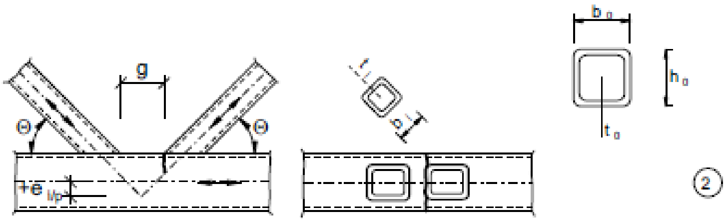
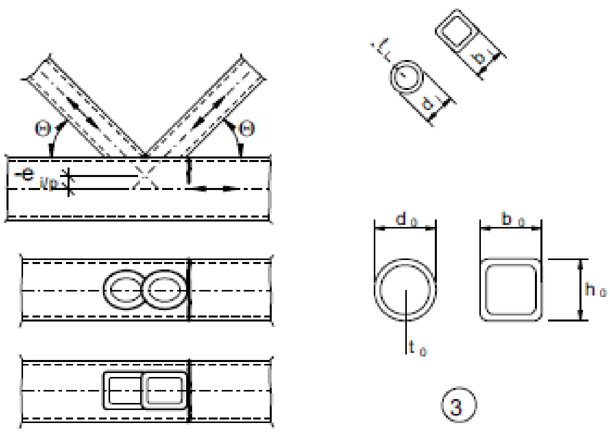
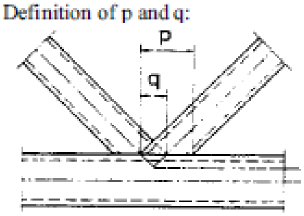
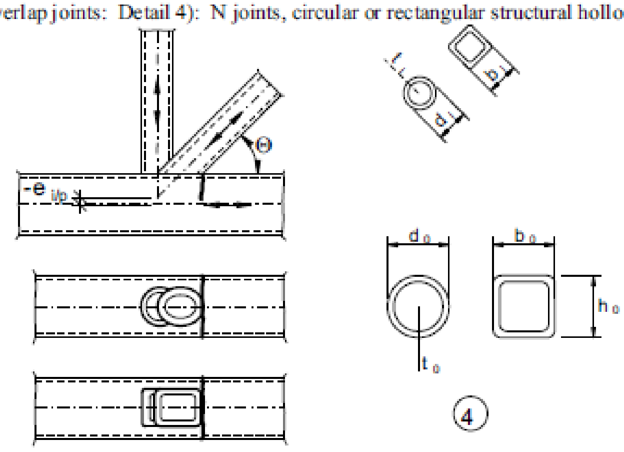
Detail category		Constructional detail	Requirements
90 m=5	$\frac{t_0}{t_i} \geq 2{,}0$	Gap joints: Detail 1): K and N joints, circular structural hollow sections: 	<u>Details 1) and 2):</u> - Separate assessments needed for the chords and the braces. - For intermediate values of the ratio t_0/t_i interpolate linearly between detail categories. - Fillet welds permitted for braces with wall thickness $t \leq$ 8 mm. - t_0 and $t_i \leq 8$mm - $35° \leq \theta \leq 50°$ - $b_0/t_0 \times t_0/t_i \leq 25$ - $d_0/t_0 \times t_0/t_i \leq 25$ - $0{,}4 \leq b_i/b_0 \leq 1{,}0$ - $0{,}25 \leq d_i/d_0 \leq 1{,}0$ - $b_0 \leq 200$ mm - $d_0 \leq 300$ mm - $-0{,}5h_0 \leq e_{i/p} \leq 0{,}25h_0$ - $-0{,}5d_0 \leq e_{i/p} \leq 0{,}25d_0$ - $e_{o/p} \leq 0{,}02b_0$ or $\leq 0{,}02d_0$ [$e_{o/p}$ is out-of-plane eccentricity] <u>Detail 2):</u> $0{,}5(b_o - b_i) \leq g \leq 1{,}1(b_o - b_i)$ and $g \geq 2t_o$
45 m=5	$\frac{t_0}{t_i} = 1{,}0$		
71 m=5	$\frac{t_0}{t_i} \geq 2{,}0$	Gap joints: Detail 2): K and N joints, rectangular structural hollow sections: 	
36 m=5	$\frac{t_0}{t_i} = 1{,}0$		
71 m=5	$\frac{t_0}{t_i} \geq 1{,}4$	Overlap joints: Detail 3): K joints, circular or rectangular structural hollow sections: 	<u>Details 3) and 4):</u> - 30 % $\leq$ overlap $\leq$ 100 % - overlap = (q/p) × 100 % - Separate assessments needed for the chords and the braces. - For intermediate values of the ratio t_0/t_i interpolate linearly between detail categories. - Fillet welds permitted for braces with wall thickness $t \leq$ 8 mm. - t_0 and $t_i \leq 8$mm - $35° \leq \theta \leq 50°$ - $b_0/t_0 \times t_0/t_i \leq 25$ - $d_0/t_0 \times t_0/t_i \leq 25$ - $0{,}4 \leq b_i/b_0 \leq 1{,}0$ - $0{,}25 \leq d_i/d_0 \leq 1{,}0$ - $b_0 \leq 200$ mm - $d_0 \leq 300$ mm - $-0{,}5h_0 \leq e_{i/p} \leq 0{,}25h_0$ - $-0{,}5d_0 \leq e_{i/p} \leq 0{,}25d_0$ - $e_{o/p} \leq 0{,}02b_0$ or $\leq 0{,}02d_0$ [$e_{o/p}$ is out-of-plane eccentricity] Definition of p and q: 
56 m=5	$\frac{t_0}{t_i} = 1{,}0$		
71 m=5	$\frac{t_0}{t_i} \geq 1{,}4$	Overlap joints: Detail 4): N joints, circular or rectangular structural hollow sections: 	
50 m=5	$\frac{t_0}{t_i} = 1{,}0$		

Table 8.8: Orthotropic decks – closed stringers

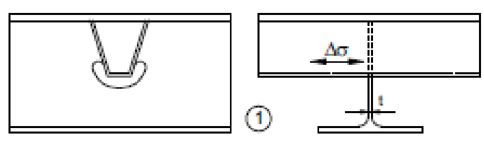
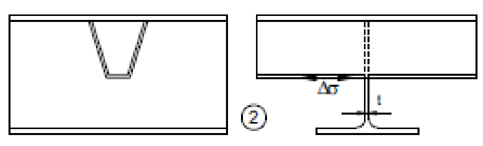
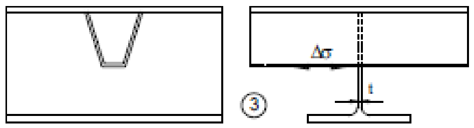
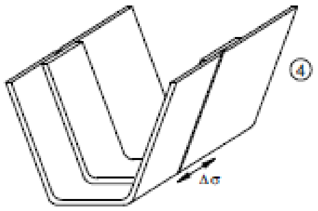
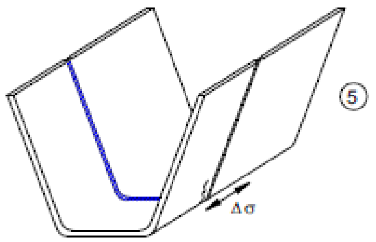
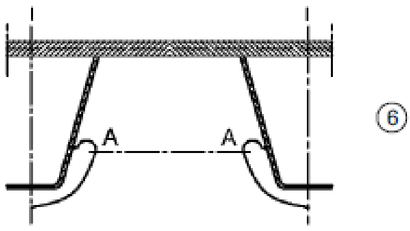
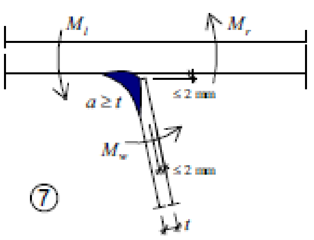
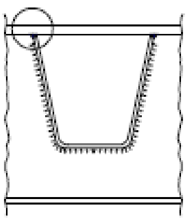
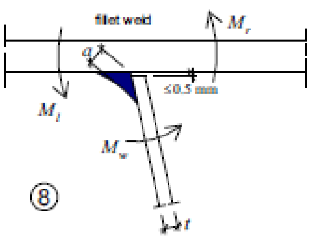
Detail category	Constructional detail		Description	Requirements
80	t≤12mm		1) Continuous longitudinal stringer, with additional cutout in cross girder.	1) Assessment based on the direct stress range Δσ in the longitudinal stringer.
71	t>12mm			
80	t≤12mm		2) Continuous longitudinal stringer, no additional cutout in cross girder.	2) Assessment based on the direct stress range Δσ in the stringer.
71	t>12mm			
36			3) Separate longitudinal stringer each side of the cross girder.	3) Assessment based on the direct stress range Δσ in the stringer.
71			4) Joint in rib, full penetration butt weld with steel backing plate.	4) Assessment based on the direct stress range Δσ in the stringer.
112	As detail 1, 2, 4 in Table 8.3		5) Full penetration butt weld in rib, welded from both sides, without backing plate.	5) Assessment based on the direct stress range Δσ in the stringer. Tack welds inside the shape of butt welds.
90	As detail 5, 7 in Table 8.3			
80	As detail 9, 11 in Table 8.3			
71			6) Critical section in web of cross girder due to cut outs.	6) Assessment based on stress range in critical section taking account of Vierendeel effects. **NOTE** In case the stress range is determined according to EN 1993-2, 9.4.2.2(3), detail category 112 may be used.
71		$\Delta\sigma = \frac{\Delta M_w}{W_w}$ 	<u>Weld connecting deck plate to trapezoidal or V-section rib</u> 7) Partial penetration weld with a ≥ t	7) Assessment based on direct stress range from bending in the plate.
50			8) Fillet weld or partial penetration welds out of the range of detail 7)	8) Assessment based on direct stress range from bending in the plate.

Table 8.9: Orthotropic decks – open stringers

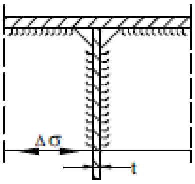
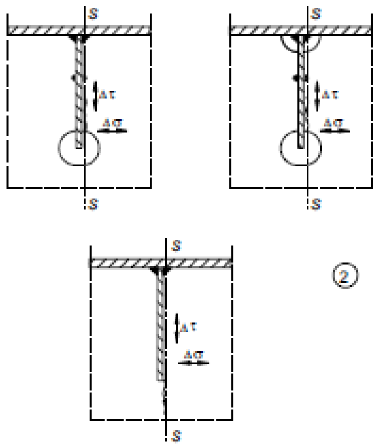
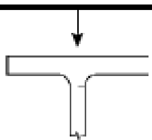
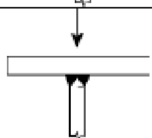
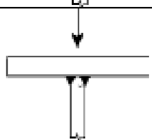
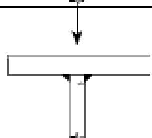
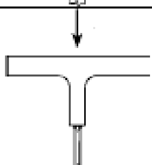
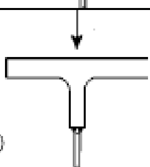
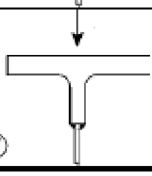
Detail category		Constructional detail	Description	Requirements
80	t≤12mm	 ①	1) Connection of longitudinal stringer to cross girder.	1) Assessment based on the direct stress range $\Delta\sigma$ in the stringer.
71	t>12mm			
56		 ②	2) Connection of continuous longitudinal stringer to cross girder. $\Delta\sigma = \frac{\Delta M_s}{W_{net,s}}$ $\Delta\tau = \frac{\Delta V_s}{A_{w,net,s}}$ Check also stress range between stringers as defined in EN 1993-2.	2) Assessment based on combining the shear stress range $\Delta\tau$ and direct stress range $\Delta\sigma$ in the web of the cross girder, as an equivalent stress range: $\Delta\sigma_{eq} = \frac{1}{2}\left(\Delta\sigma + \sqrt{\Delta\sigma^2 + 4\Delta\tau^2}\right)$

Table 8.10: Top flange to web junction of runway beams

Detail category	Constructional detail	Description	Requirements
160	① 	1) Rolled I- or H-sections	1) Vertical compressive stress range $\Delta\sigma_{vert.}$ in web due to wheel loads
71	② 	2) Full penetration tee-butt weld	2) Vertical compressive stress range $\Delta\sigma_{vert.}$ in web due to wheel loads
36*	③ 	3) Partial penetration tee-butt welds, or effective full penetration tee-butt weld conforming with EN 1993-1-8	3) Stress range $\Delta\sigma_{vert.}$ in weld throat due to vertical compression from wheel loads
36*	④ 	4) Fillet welds	4) Stress range $\Delta\sigma_{vert.}$ in weld throat due to vertical compression from wheel loads
71	⑤ 	5) T-section flange with full penetration tee-butt weld	5) Vertical compressive stress range $\Delta\sigma_{vert.}$ in web due to wheel loads
36*	⑥ 	6) T-section flange with partial penetration tee-butt weld, or effective full penetration tee-butt weld conforming with EN 1993-1-8	6) Stress range $\Delta\sigma_{vert.}$ in weld throat due to vertical compression from wheel loads
36*	⑦ 	7) T-section flange with fillet welds	7) Stress range $\Delta\sigma_{vert.}$ in weld throat due to vertical compression from wheel loads