1. Introduction;

The concrete or steel ground sockets so far generally used for signal applications allowed for the utilization of ram tube foundations with concrete head. In accordance with the current state of development, ram tube foundations with adapter are to be used as regular foundations from now on. The decision if – deviating from this type of ram foundation – a foundation previously cleared by DB Netz AG will be used is to be taken dependent on the local conditions and economic considerations.

2. Design

The link between ram tube and superstructure is an adapter made of hot-dip galvanized steel that is permanently connected to the ram tube by way of casting. The orthogonal hole spacing in the adapter is 390 mm for the large design. Refer to the technical drawings of the signal base adapters 'large design' for details.

3. Soil

Knowledge of the soil conditions encountered on site is essential for establishing the ram tube foundation. If such knowledge does not exist, soil surveys will be indispensable. The soil parameters are decisive for the dimensioning of the ram tube

4. Ram tube

The length of the ram tube is determined based on the forces to which adapter and ram tube are subject and the prevailing soil conditions. The basis for the dimensioning of the ram tube is the following loads (stress).

Large design (characteristic values).

Normal force Nk	11.0 kN	
Deflection II Mx,k	39.0 kNm	(parallel to track)
Deflection _I_ My,k	39.0 kNm	(perpendicular to track)
Torsion Mz,k	0.0 kNm	
Transverse force II Fy,k	8.0 kN	(parallel to track)
Transverse force _I_ Fx,k	8.0 kN	(perpendicular to track)

With known soil conditions[a] the required ram tube lengths[b] may be utilized as follows without the need to obtain a soil expertise:

a) Plane terrain;

[tube length [b]	Subsoil [a]]
6.0 m	Cohesive soil (min. stiff) and groundwater ≤ 0.8 m below UTE*
5.0 m	Cohesive & composite soil

4.5 m	Non-coh. soil (min. medium dense) and groundwater ≤ 0.8 m below UTE*
4.0 m	Non-cohesive soil

* UTE = Upper Track Edge

Note: Case a) may be applied as of a slope shoulder > 0.75 m and a max. slope of 1:1,5.

May be utilized for: -light signals Ks & HV, narrow and gantry masts - RR crossing safety facilities				DB Netz AG		S 8240.25.2 t
						Issue
						Date
					Date	Name
				Resp.	5.2011	Müller
				Verif.	5.2011	Albert
				Sign.		
						Mounting instructions for ram tube with adapter Type I - large design -
				I.NVT 342		Page 1 of 3
2	Stresses altered	10.11	Mü			
	Alteration	Date	Name	Origin		Replaces

b) Slopes;

[tube length [b]	Subsoil [a]]
6.0 m	Cohesive soil (min. stiff) and coarse soil
6.5 m	Non-cohesive and composite soil

5. Corrosion protection
The adapter is hot-dip galvanized ≥ 80 µm in acc. with DIN EN ISO 1461.

6. Position of ramming point
The distance from the track centerline to the position of the ramming point depends on the applicable guidelines and specifications for the facility to be erected at the track, the clearance gauge GC and the local conditions.

7. Performance of ramming operations
Prior to the beginning of the ramming operations, the construction site manager shall procure information regarding the location of cables or of other installations on the basis of information provided by DB AG. Optionally, exploration digging shall be performed in accordance with the cable test sheet prior to the ramming operations.

8. Installation of the signal base adapter (design BBL – Bahnbau Lüneburg)
Position the adapter onto the ram tube (for signals, position the adapter so that the edge side of the adapter is evidently perpendicular to the signal alignment point), adjust with the set screws and bolt to the ram tube. Make sure that the adapter head plate is absolutely horizontal. Next use the injector openings to fill the space between ram tube and adapter with anchor grout (Pagel).
In individual cases, define the vertical position of the superstructure (e.g. signal) on site by subsequently drilling through holes into the adapter.
Any offset ramming that is required vis-à-vis the signal position may be compensated for by using gantries with different lengths. Please refer to the technical drawings for details.

9. Installation of the signal base adapter (design LW – Leonard Weiss)
Position the adapter onto the ram tube (for signals, position the adapter so that the edge side of the adapter is evidently perpendicular to the signal alignment point), secure and adjust using the mounting aid. Make sure that the adapter head plate is absolutely horizontal. Next, fill the space between ram tube and adapter tube with concrete.
Any offset or out-of-position ramming that is required vis-à-vis the signal position may be compensated up to 95 mm due to the eccentric design of the adapter. Height compensation of the adapter is possible up to 150 mm.

10. Note:
Bars (< through bores) may be used as insertion and adjustment aids when positioning the signal onto the adapter. Utilize shims for a possibly required horizontal height compensation between adapter and signal base plate as shown in the technical drawing. For this purpose, the signal – if adapter BBL is used - may be moved to the required position by means of pressure screws inserted into the tapped holes of the adapter.

[a] Minimum requirements on subsoil for use of table values:

All soils: $\delta_a = 2/3\ \varphi$; $\delta_p = -\varphi/2$

Min. soil parameters	Non-cohesive soils	Cohesive soils	Composite soils
E_{sk} [MN/m^2]	20	10 (5) (for values between 5 and 10, increase the wall thickness to 14.2 mm)	10
cal E_{sk} [MN/m^2]	12	6 (3)	6
C [kN/m^2]	-	5	-
φ [°]	30	22.5	27.5
γ [kN/m^2]	18	18	20
γ [kN/m^2]	10	8	10

[b] All tube lengths applicable to steel tubes of size Ø 323.9 mm x 10 mm or larger (cf. technical drawing)