



高鐵香港段列車的安全管理措施

Safety Management Measures for the XRL Trains

04/07/2014



背景資料 Background

- 高鐵香港段全長26公里，是全國16,000公里國家高速鐵路網的一部分
XRL – 26km extension of the China National High Speed Rail Network
- 與國內系統完全兼容
Has to be fully compatible with the national system
- 客運專線 – 國內段最高時速350公里，香港段時速200公里
Dedicated passenger service line with maximum speed of 350kph lines in the Mainland, and 200kph in Hong Kong section
- 全綫由信號系統（列車自動保護系統）保護，並有多重後備與冗餘設備以提高可靠度
The line is fully protected by a Signalling (Automatic Train Protection) System, with multiple level of backup and redundancy
- 在2012年按世貿規定的國際招標購買9列高速列車
Procured 9 trains in Year 2012 via international open tender conforming to WTO
- 選購了成熟可靠的CRH380A型號
Matured & proven CRH380A train was selected

保障列車的安全營運

Protection of Train Safe Operation

➤ 主動防護

Active Protection Concept

- 採用信號系統防止發生意外
Avoid collision by fail safe and reliable signalling system
- 日本的新幹綫與台灣等廣泛採用
Adopted by Japan and Taiwan

➤ 高系統可靠度

High Reliability

- 信號系統提供三重保護
Protected by three layers of signalling system
- 每重系統均設有冗餘保護
Each layer with redundant protection
- 可保障列車在高速與低速下行車安全
Protect both high speed and low speed operation

保障列車的安全營運

Protection of Train Safe Operation continue

第一重：中國列車控制3型系統 - 與歐盟 ETCS-2型系統相若

1st Tier System: CTCS (Chinese Train Control System) - 3 system, comparable to ETCS (European Train Control System) - 2 system

第二重：中國列車控制2型系統 - 與歐盟 ETCS-1型系統相若

2nd Tier System: CTCS-2 system

第三重：軌旁信號燈

3rd Tier System: Line Side Signals

➤ 使用獨立客運專線

Dedicated Passenger Line

- 獨立軌道和隧道

Segregated line

- 不存在與貨運或其他列車混跑

No mixed traffic with freight trains

- 與路面交通完全分隔

No share road surface with road vehicles

保障列車的安全營運

Protection of Train Safe Operation continue

- 萬一出現多重信號系統故障時，行車將受嚴密的安全守則與程序監管

During rare case of multiple signalling failure, operation will be governed by stringent rules and procedure

- 限速行車

Operation at limited speed

- 每一路段只容許一部列車行駛通過

Only one train per block or section

- 確保列車有足夠的安全間隔

Ensure safe train separation

- 根據EN15227的程序要求進行風險評估

Carried out risk assessment as recommended in EN15227

- 確定系統安全

Confirming the system is safe

- 並經歐洲獨立專家確認

Independently reviewed and endorsed by safety expert consultant

EN15227在國內與其他地方高鐵使用情況

Adoption of EN15227 in the Mainland & Other Counties HS System

- 今年五月再次向國內各高鐵生產商與中國鐵路總公司了解
Recent dialogue with China HS train manufacturers & China Railway Corporation
- 中國高鐵沒有需要，因此也沒有採用此標準
Not adopted as not considered necessary
 - 客運專線沒有與路面共用的平交道
Dedicated passenger line without share use of level crossing
 - 全綫信號系統保護，並有多重後備
Fully protected by reliable signalling system
- 所有CRH高鐵列車並不是按15227設計與生產
All China CRH trains were not design & built to meet EN15227
 - 並沒有能在國內系統使用的15227高鐵列車
No such product available that suits the requirements in China
- 標準會在歐盟國家採用，但在世界其他地區包括日本不普遍
Adopted in EU countries, but not common in other countries like Japan

歐盟EN15227標準

EU Standard EN15227

- 在歐洲營運中鐵路提供**低速行車**的耐撞程度保障
Trans European Network (TEN) routes, for protection under Low Speed Operation
- 時速36公里以上時**不能**提供任何保障
No protection for speed above 36kph
- 此歐盟標準列出以下情景
The following scenarios are listed in the standard



列車與列車
Identical train unit



80噸運輸拖架
80t wagon



15噸可變形物（如汽車與小貨車）
與其它雜物
15t deformable and other smaller obstacles

歐盟EN15227標準

EU Standard EN15227

➤ EN15227中包括下列處理方式以適應不同綫路情況

The standard may not be applicable to all situations, and mentioned the following process to ensure railway safety

- 第5章 “.....鐵路營運機構有責任按其鐵路情況選擇適合的標準.....”

Section 5 “... it shall be the responsibility of the operator to determine the applicable scenarios and the appropriate limiting design case for each...”

- 附件A “.....營運機構應證明已採用適當的配置以保護其職員與乘客.....”， “如當地法例並沒有列明所要求，而表二中列舉的碰撞場境並不適用時，營運機構應選擇合適的標準.....”

Annex A “... the operator should demonstrate that suitable and sufficient provision has been made to protect staff and passengers ...”, “Where there are no regulations specifying the limiting conditions and where the design collision scenario parameters in Table 2 are not applicable. The operator should demonstrate that suitable and sufficient provision has been made ...”

結論

Conclusion

- 高鐵香港段系統設計與未來營運是安全的
The XRL system and future operation is safe
- 行車安全保障有賴信號系統提供的主動防護與嚴謹的營運程序
Active signalling protection and stringent operation procedures to ensure safe operation of XRL
- 高鐵香港段系統設計與行車安全是經獨立安全專家審核
XRL Train safety arrangement reviewed & confirmed by third party safety experts
- 程序合符EN15227中列明之精神與處理方法
Conformed to the process requirements as specified in EN15227