



Accreditation number STS 409
Accreditation standard ISO/IEC 17025:2005

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Group of products or materials, field of activity	Principle of measurement ²⁾ (characteristics, measuring ranges, type of test)	Test methods, remarks (national, international standards, validated in-house test methods)
Dynamic strength on test rigs	Bogie frames, components, mounted components, wheel set axles, wheel discs	UIC 515, UIC 615, prEN 13749, EN 13103, EN 13104, prEN 13979
Dynamic strength at field tests, service load collectives	Bogie frames, components, mounted components, wheel set axles, wheel discs, body frames and car bodies	Eurocode 3 (ENV 1993), FKM-Rules, proprietary procedure (2-086, Verfahrensweisung - Messungen von Betriebslastkollektiven), procedures as agreed with customer and/or authorities, DIN 45667
Noise measurements (railways)	<ul style="list-style-type: none"> • Internal and external noise • Noise while running, braking acceleration and at standstill • Air-borne and structure-borne noise • Determination of source locations 	TSI Noise, EN ISO 3095, prEN ISO 3095 (TSI Noise refers explicitly to prEN ISO 3095) and EN ISO 3381, UIC 644, UIC 651, ISO 3740, ISO 3741, ISO 3743, ISO 3744, ISO 3745, ISO 3746, ISO 3747, prEN 15892
Noise measurements on equipment	Noise emission	<p>MaLV (Maschinenlärmverordnung) SR 814.412.2 and Directive 2000/14/EC noise emission in the environment by equipment for use outdoors with following standards: ISO 3744, ISO 4871, ISO 11094, ISO 22868, ISO 8528</p> <p>Notified body EU identification numer NB 1990 according to directive 2000/14/EC</p>
Noise measurements common	Workplaces	ISO 6396

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Test and measurement of braking systems	<ul style="list-style-type: none"> • Static and functional tests and measurements including behaviour versus time, Behaviour in failure conditions. • Dynamic tests and measurements, braking distance measurements, determination of thermal load • Check of the slide protection system and the anti slip protection system (traction control system) 	<p>UIC Rolling Stock, Brakes (UIC 54) UIC 540, UIC 541-03, UIC 541-04, UIC 541-05, UIC 541-06, UIC 541-07, UIC 541-08, UIC 541-1, UIC 541-2, UIC 541-3, UIC 541-4, UIC 541-5, UIC 542, UIC 543, UIC 544-1, UIC 544-2, UIC 545, UIC 546, UIC 547 and UIC 549</p> <p>Regulation "Regelungen für die bremstechnische Beurteilung von Schienenfahrzeugen im Rahmen der Abnahme nach §32 EBO" (only available in German)</p>
Thermal measurements	Air and material temperatures	Proprietary procedures (2-090 Verfahrensanweisung – Temperaturmessung)
Indication measurements	Determination of the power of steam engines with pressure measurements at saturated and super-heated steam as well as stroke measurement	Proprietary procedures (2-084 Verfahrensanweisung - Indizieren)
Rolling stock related measurements at the infrastructure	Track geometry, rail roughness, rail profiles, measurements on rack systems, determination of equivalent conicity	<ul style="list-style-type: none"> • Track construction regulations, which describe the related infrastructure, for example in Switzerland for normal gauge railways: AB-EBV and SBB-Reglement 220.4 • UIC 518, TSI, EN 14363
Drive system dynamics and friction condition between wheel and rail	Measurement of tractive and brake effort and slip, check of behaviour of anti slip protection system (traction control system)	Proprietary procedures (2-085 Verfahrensanweisung - Messungen von Kraftschluss, Antriebsschwingungen und Antriebsdynamik)



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Roughness measurements	Measurement of wheel and rail roughness	<ul style="list-style-type: none"> • Direct measurements according proprietary procedure to fulfill EN ISO 3095 and EN ISO 3381 (2-088 Verfahrensanweisung - Schienen-Rauheitsmessungen), prEN 15610 • Indirect methode over acceleration measurements according method of TNO Institute of Applied Physics, Delft (NL)
Decay rate	Measurement of decay rate on rails	EN 15461
Rolling stock, trolley buses	Measurements of tractive and breaking effort, diagrams for: <ul style="list-style-type: none"> • train sets • standard compositions • multi purpose locos • trolley buses 	Proprietary validated procedures according to work instruction SER-20-30-40 007818 DIN EN 50215
Rolling stock, trolley buses	Line interference and disturbance measurements: <ul style="list-style-type: none"> • Psophometrically weighted current • Frequency selective evaluation of current • Measuring with Rogowski-coil, current transducers and / or on vehicle installed transducers which can be calibrated 	Proprietary validated procedures according to work instruction SER-20-30-40 007819 Specifications of customers and network operators DIN EN 50215 DIN EN 50121 DIN EN 50238 ITU-T 0.41

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Measurand	<ul style="list-style-type: none"> • Sound pressure, sound intensity, sound power measurements (and derived quantities) • Frequency, counter, time • Profile (wheel and rail) as well as vehicle gauge • Roughness (wheel and rail) <p>And all the deriving units</p> <ul style="list-style-type: none"> • Voltages (electrical, DC/AC) • Currents (electrical, DC/AC) • Velocities • Forces 	<ul style="list-style-type: none"> • IEC 651, IEC 804, ISO 354, ISO 717, ISO 3740, ISO 3741, ISO 3743, ISO 3744, ISO 3745, ISO 3746, ISO 3747, EN ISO 3095, EN ISO 3381, prEN 15892, ISO 4871, ISO 11094, ISO 22868, ISO 8528 • Special application of displacement measurement • EN ISO 3095/EN ISO 3381/prEN 15610

Abbreviations:

UIC	Internationaler Eisenbahnverband / International Union of Railways (Grundbegriff franz: Union internationale des chemins de fer)
ORE	Forschungs- und Versuchsamt des Internationalen Eisenbahnverbandes / Office for Research and Experiments of the International Union of Railways
ENV	EN Vornorm/ EN pre-norm
FKM	Forschungskuratorium Maschinenbau /Forschungskuratorium Maschinenbau
TSI	Technische Spezifikationen für die Interoperabilität / Technical Specifications for Interoperability
EBO	Eisenbahn-Bau- und Betriebsordnung / Eisenbahn-Bau- und Betriebsordnung
AB-EBV	Ausführungsbestimmungen zur Schweiz. Eisenbahnverordnung / Ausführungsbestimmungen zur Schweiz. Eisenbahnverordnung
TNO	Niederländische Organisation für Angewandte Naturwissenschaftliche Forschung / Institute of Applied Physics

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