

**Synonyms:** Schwazer Dolomit (PICHLER, 1860; PIRKL, 1961); Spielberg-Dolomit (TOLLMANN, 1977: p. 494).

**Lithology:** Grey, coarse sparry dolomite subdivided into two types: a) laminated dolomite without fossils and biotrititic material in the lower parts; b) dolomitic and biotrititic limestones and dolomite in the upper parts (PIRKL, 1961; MOSTLER, 1968).

**Fossils:** Nautilids, crinoids, corals, bivalves, conodonts.

**Origin, facies:** Shallow water shelf environment.

**Chronostratigraphic age:** Lower Devonian (Lochkovian–Pragian).

**Biostratigraphy:** Conodonts (PIRKL, 1961; MOSTLER, 1964, 1968) point to Lochkovian–Pragian ages.

**Thickness:** 600 m.

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** “Dolomites”.

**Overlying unit(s):** -

**Lateral unit(s):** Spielberg Dolomite, “Dolomites, Flaser Limestones”.

**Geographic distribution:** W-GWZ; Tyrol, Kitzbüheler Alpen.

**Remarks:** see unit “Dolomites”.

**Complementary references:** TOLLMANN (1977), SCHÖNLAUB (1979, 1980a), EBNER et al. (1989).

### Spielberg-Dolomit / Spielberg Dolomite

FRITZ EBNER

**Validity:** Invalid; since the first description by MAVRIDIS & MOSTLER (1970) used in terms of a formation but without formalization.

**Type area:** Kitzbüheler Alpen (ÖK50-UTM, map sheet 3214 Kitzbühel, ÖK50-BMN, map sheet 123 Zell am See).

**Type section:** At Spielberghorn but not further indicated in the literature.

**Reference section(s):** -

**Derivation of name:** After the Mt. Spielberghorn (N 47°25'57" / E 21°37'56"; ÖK50-UTM, map sheet 3214 Kitzbühel, ÖK50-BMN, map sheet 123 Zell am See) in the Kitzbüheler Alpen.

**Synonyms:** Partly “Schwaz-Dolomit” (TOLLMANN, 1977: p. 494); “Wilde Hag-Pfeiferkogel-Serie” (EMMANULIDIS & MOSTLER, 1970).

**Lithology:** Light dolomite, rarely with reddish-grey and partly black dolomite (MAVRIDIS & MOSTLER, 1970; EMMANULIDIS & MOSTLER, 1970).

**Fossils:** Detritus of crinoids, corals, bryozoans, gastropods, stromatoporids and ostracods (MAVRIDIS & MOSTLER, 1970; EMMANULIDIS & MOSTLER, 1970).

**Origin, facies:** Shallow water shelf environment (reworked biostromes) (MAVRIDIS & MOSTLER, 1970).

**Chronostratigraphic age:** Lower Devonian–?Eifelian.

**Biostratigraphy:** Corals indicate a Devonian age.

**Thickness:** Some hundreds of meters?

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** “Dolomites”.

**Overlying unit(s):** “Dolomites, Flaser Limestones”.

**Lateral unit(s):** Schwaz Dolomite, “Dolomites, Flaser Limestones”.

**Geographic distribution:** W-GWZ; Tyrol, Salzburg, Kitzbüheler Alpen.

**Remarks:** The younger age (?Emsian–?Eifelian) of the Spielberg Dolomite is the reason for separating it from the Schwaz Dolomite (MAVRIDIS & MOSTLER, 1970). For further remarks see unit “Dolomites”.

**Complementary references:** TOLLMANN (1977), SCHÖNLAUB (1979, 1980a), EBNER et al. (1989), SCHÖNLAUB & HEINISCH (1993).

### Dolomite, Flaserkalke / Dolomites, Flaser Limestones

FRITZ EBNER

**Validity:** Invalid; not formalized informal working term (SCHÖNLAUB & HEINISCH, 1993).

**Type area:** Kitzbüheler Alpen (ÖK50-UTM, map sheet 3214 Kitzbühel, ÖK50-BMN, map sheet 122 Kitzbühel).

**Type section:** Within the Wildseeloder Unit at the Spielberg and Kitzbüheler Horn, not further indicated.

**Reference section(s):** -

**Derivation of name:** According to the main lithologies.

**Synonyms:** Rote Flaserdolomite, dunkle Dolomite mit hohem Tongehalt, dunkelgraue, grobspätige Dolomite, Tonschiefer, Kalktonschiefer, Tonflaserkalke und Kieselschiefer der “Südfazies” (MAVRIDIS & MOSTLER, 1970); “rotgefärbte Dolomite/Flaserdolomite der Kitzbüheler Horn Serie” (EMMANULIDIS & MOSTLER, 1970).

**Lithology:** Dolomite (red-reddish flaser- and nodular dolomite, dark grey coarse sparry dolomite, dark clayey dolomite), flaser limestones with Fe-Mn crusts, shales, siliceous shales (EMMANULIDIS & MOSTLER, 1970; MAVRIDIS & MOSTLER, 1970).

**Fossils:** Conodonts, nautiloids, crinoids (EMMANULIDIS & MOSTLER, 1970; MAVRIDIS & MOSTLER, 1970).

**Origin, facies:** Basinal, pelagic environment.

**Chronostratigraphic age:** Devonian (?upper Lochkovian–lower Famennian) (EMMANULIDIS & MOSTLER, 1970; MAVRIDIS & MOSTLER, 1970).

**Biostratigraphy:** Exact dating is only possible in the early Late Devonian by species of the conodont genus *Palmatolepis*.

**Thickness:** About 30 m.

**Lithostratigraphically higher rank unit:** “Südfazies” (MAVRIDIS & MOSTLER, 1990), “Kitzbüheler Horn-Serie” (EMMANULIDIS & MOSTLER, 1970) – both units are informal.

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** “Dolomites”.

**Overlying unit(s):** -

**Lateral unit(s):** Kitzbüheler Alpen: Schwaz and Spielberg Dolomite, Dientener Berge (Entachen Alm; ÖK50-UTM, map sheet 3221 Zell am See, ÖK50-BMN, map sheet 124 Saalfelden): red dolomite interfingering with reddish limestone or metasomatic magnesite (MOSTLER, 1968).

**Geographic distribution:** W-GWZ; Tyrol, Kitzbüheler Alpen.

**Remarks:** See remarks at unit “Dolomites”.

### E-Grauwackenzone / Eastern Greywacke Zone (E-GWZ)

The E-GWZ is dominated by Variscan fold and thrust tectonics as well as Alpine imbrication and thrust tectonics. The Alpine structure was arranged during the Eo-Alpine (Early to Mid-Cretaceous) thrusting and the formation of top to the NW directed ductile fabrics under low grade metamorphic conditions, which did not exceed significantly 350–400°C (NEUBAUER et al., 1994; RANTITSCH et al., 2004). All units of the E-GWZ were covered primarily by Permo-Mesozoic sediments. For the primary arrangement of the individual tectonic units before Alpine thrusting the following position is suggested from ESE to WNW (NEUBAUER et al., 1994): Noric Nappe – Kaintaleck Nappe – Silbersberg Nappe – Veitsch Nappe – “Middle Austroalpine” Unit (= Silvretta-Seckau Nappe; SCHMID et al., 2004).

The key area for stratigraphic investigations in the Noric Nappe is around Eisenerz (ÖK50-UTM, map sheet 4215 Eisenerz, ÖK50-BMN, map sheet 101 Eisenerz) where detailed stratigraphic studies were carried out mainly on the basis of conodonts by FLAJS and SCHÖNLAUB in the 1970s and 1980s. During this period summarizing lithological terms used earlier, as e.g., “Feinschichtige Grauwackenschiefer” and “Erzführender Kalk” were replaced by lithostratigraphic units documented in the ASC 2004 (PILLER et al., 2004). However, most of these units are only described as working terms in an informal way and named according to their characteristic lithologies. In the very eastern parts of the Noric Nappe modern stratigraphic studies are entirely missing.

Modern stratigraphic research of the Veitsch Nappe was concentrated at the Hohentauern-Sunk area (RATSCHBACHER, 1984, 1987). The sequences of the Kaintaleck and the Silbersberg Nappes are not represented in the ASC 2004. The first includes a pre-middle Paleozoic metamorphic basement and the second is composed of Lower Paleozoic quartzphyllite and Verrucano-type (Permo-Triassic) metaclastics (NEUBAUER et al., 1994). Additionally, the Silbersberg Nappe is intruded at one site (Gloggnitz) by a 110(?)–140 Ma old magmatic rock (Riebeckit gneiss; NEUBAUER et al., 1994).

#### Noric Nappe

The stratigraphic sequence of the Noric Nappe is similar to that of the W-GWZ. Especially the Blasseneck Porphyry forms an excellent stratigraphic marker, which can be followed along the GWZ for 320 km from Gloggnitz (Lower Austria) in the E as far as to Schwaz in Tyrol in the W.

#### Kalwang Konglomerate / Kalwang Conglomerate

FRITZ EBNER

**Validity:** Invalid; lithologically well described unit (DAURER & SCHÖNLAUB, 1978) of uncertain age and position.

**Type area:** Eisenerzer Alpen (ÖK50-UTM, map sheet 4215 Eisenerz, ÖK50-BMN, map sheet 131 Kalwang).

**Type section:** Lange Teichen valley (N 47°28'16" / E 14°48'35") NE Kalwang (ÖK50-UTM, map sheet 4215

**Complementary references:** TOLLMANN (1977), SCHÖNLAUB (1979, 1980a), EBNER et al. (1989), SCHÖNLAUB & HEINISCH (1993).

Eisenerz, ÖK50-BMN, map sheet 131 Kalwang) (DAURER & SCHÖNLAUB, 1979; LOESCHKE et al., 1990).

**Reference section(s):** -

**Derivation of name:** After the village of Kalwang (N 47°25'39" / E 14°45'26"), ÖK50-UTM, map sheet 4215 Eisenerz (ÖK50-BMN, map sheet 131 Kalwang) and the lithology.

**Synonyms:** “Kalwang Gneiskonglomerat” (DAURER & SCHÖNLAUB, 1978).

**Lithology:** Greenschists (metatuffs; chlorite-actinolite-epidote schists) including a package of banded greenschists (metatuffs) with pebbles of gneisses (=Kalwang Conglomerate with pebbles of quartz-rich metagranitoids, albite-granite gneisses and quartz). The greenschists are overlain by white micamarble (DAURER & SCHÖNLAUB, 1978; LOESCHKE et al., 1990).

**Fossils:** -

**Origin, facies:** Debris flow within greenschists in the Lange Teichen valley (LOESCHKE et al., 1990) or a transgressive conglomerate above the Kaintaleck metamorphic complex (NEUBAUER et al., 1994).

**Chronostratigraphic age:** Ordovician or post-Devonian. The latter is depending on the correctness of the correlation of the Kalwang Conglomerate with the conglomerate at Frauenberg (NEUBAUER, 1985; NEUBAUER et al., 1994).

**Biostratigraphy:** -

**Thickness:** Lange Teichen valley: greenschists 50 m, conglomerates 15 m, marble 15 m; Frauenberg: conglomerate 15 m.

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** Units of the Veitsch Nappe in tectonic contact (SCHÖNLAUB, 1979).

**Overlying unit(s):** Gerichtsgraben Formation.

**Lateral unit(s):** Conglomerate at Frauenberg (NEUBAUER, 1985) – not indicated in the ASC 2004.

**Geographic distribution:** E-GWZ; Styria, Eisenerzer Alpen, ESE of Kapfenberg.

**Remarks:** The position of the Kalwang Conglomerate is strongly under discussion. Previously, as also shown in the ASC 2004, the Kalwang Conglomerate was regarded as the pre-Late Ordovician structural base of the Noric Nappe of the E-GWZ (DAURER & SCHÖNLAUB, 1978; SCHÖNLAUB, 1979, 1982a, b; LOESCHKE et al., 1990). Later, supported by thrust planes mapped above the Kalwang Conglomerate in the Lange Teichen valley, LOESCHKE et al. (1990) interpreted the Kalwang Conglomerate as a tectonic unit below the Noric Nappe. Finally, the Kalwang Conglomerate is regarded as an equivalent of gneiss conglomerates superposing the Frauenberg metamorphic complex ESE Kapfenberg (area of Frauenberg, N 47°25'29" / E 15°20'33"; ÖK50-UTM, map sheet 4217 Kindberg, ÖK50-BMN, map sheet 134 Passail) (NEUBAUER, 1985). There age data for metamorphism and magmatism range from 520 to 360 Ma

# Austrian Stratigraphic Chart 2004 - Paleozoic

(sedimentary successions)

Austrian Stratigraphic Commission



ERA	SYSTEM / PERIOD / SERIES / EPOCH	STAGE / AGE	DURATION Ma	Global Classification					
				ERATHM / ERA	SYSTEM / PERIOD / SERIES / EPOCH				
PALEOZOIC	PERMIAN	CHANGHSINGIAN / Dorashanian	251	PERMIAN	MID PERMIAN / GUADALUPIAN / LOPINGIAN				
		WUCHIAPINGIAN / Dzhulfian	255						
		CAPITANIAN	260						
		WORDIAN	265						
		ROADIAN	270						
		PERMIAN	LOWER PERMIAN / CISURALIAN			KUNGURIAN	275		
						ARTINSKIAN	280		
						SAKMARIAN	285		
						ASSELIAN	290		
		PERMIAN	TRIAS			GZHELIAN	295	TRIAS	U. CARBONIFEROUS / PENNSYLVANIAN
KASIMOVIAN	300								
MOSKOVIAN	305								
BASHKIRIAN	310								
TRIAS	LOWER CARBONIFEROUS / MISSISSIPPIAN			SERPUKHOVIAN	315				
				VISEAN	320				
				TOURNAISIAN	325				
PERMIAN	DEVONIAN			FAMENNIAN	350	DEVONIAN	UPPER DEVONIAN		
				FRASNIAN	355				
				GIVETIAN	360				
		EIFELIAN	365						
		DEVONIAN	LOWER DEVONIAN	EMSIAN	370				
				LOCHKOVIAN	375				
		PERMIAN	DEVONIAN	LUDFORDIAN / GORSTIAN	380			DEVONIAN	MIDDLE DEVONIAN
				HOMERIAN / SHEINWOOD	385				
				TELYCHIAN	390				
				AERONIAN	395				
RHUDDANIAN	400								
DEVONIAN	LOWER DEVONIAN			PRAGIAN	405				
				LOCHKOVIAN	410				
PERMIAN	DEVONIAN			WEN-LOCK / LOW	415	DEVONIAN	LOWER DEVONIAN		
				HIRNANTIAN	420				
				LLANDOVERY	425				
		AERONIAN	430						
		RHUDDANIAN	435						
		DEVONIAN	LOWER DEVONIAN	PRAGIAN	440				
				LOCHKOVIAN	445				
		PERMIAN	DEVONIAN	WEN-LOCK / LOW	450			DEVONIAN	UPPER ORDOVICIAN
				LLANDOVERY	455				
				AERONIAN	460				
RHUDDANIAN	465								
DEVONIAN	LOWER DEVONIAN			PRAGIAN	470				
				LOCHKOVIAN	475				
PERMIAN	DEVONIAN			WEN-LOCK / LOW	480	DEVONIAN	MIDDLE ORDOVICIAN		
				LLANDOVERY	485				
				AERONIAN	490				
				RHUDDANIAN	495				
		DEVONIAN	LOWER DEVONIAN	PRAGIAN	500				
				LOCHKOVIAN	505				
		PERMIAN	DEVONIAN	WEN-LOCK / LOW	510			DEVONIAN	LOWER ORDOVICIAN
				LLANDOVERY	515				
				AERONIAN	520				
				RHUDDANIAN	525				
DEVONIAN	LOWER DEVONIAN			PRAGIAN	530				
				LOCHKOVIAN	535				
PERMIAN	DEVONIAN			WEN-LOCK / LOW	540	DEVONIAN	UPPER CAMBRIAN		
				LLANDOVERY	545				
				AERONIAN	550				
				RHUDDANIAN	555				
		DEVONIAN	LOWER DEVONIAN	PRAGIAN	560				
				LOCHKOVIAN	565				
		PERMIAN	DEVONIAN	WEN-LOCK / LOW	570			DEVONIAN	MIDDLE CAMBRIAN
				LLANDOVERY	575				
				AERONIAN	580				
				RHUDDANIAN	585				
DEVONIAN	LOWER DEVONIAN			PRAGIAN	590				
				LOCHKOVIAN	595				
PERMIAN	DEVONIAN			WEN-LOCK / LOW	600	DEVONIAN	LOWER CAMBRIAN		
				LLANDOVERY	605				
				AERONIAN	610				
				RHUDDANIAN	615				
		DEVONIAN	LOWER DEVONIAN	PRAGIAN	620				
				LOCHKOVIAN	625				



- Legend**
- pelagic, offshore, siliciclastic
  - pelagic, nearshore, calcareous
  - shallow marin, neritic
  - terrestrial-continental, coarse clastic
  - terrestrial-continental, fine clastic
  - evaporite (chloride, sulphate)
  - rhyolite, dacite
  - (basaltic) andesite, trachyandesite
  - basalt
  - phyllite
  - mixed-facies (in corresponding colors)
  - coal (may include several seams)
  - ? position/age doubtful/controversial
  - | equal units
  - \ older unit left \ younger unit right
  - hiatus
  - unconformity
  - GSSP
  - Fm. Formation
  - Ls. Limestone

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Cutout and English adaptation of the "Die Stratigraphische Tabelle von Österreich 2004": Geological Survey of Austria

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